KENWOOD

HF TRANSCEIVER

Model TS-430S

INSTRUCTION MANUAL

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INTRODUCTION

You are now the owner of our most recent product, the TS-430S amateur band transceiver and general coverage receiver. Please read this instruction manual carefully before placing your new transceiver in service. This equipment has been carefully engineered and manufactured to rigid quality standards, and should give you satisfactory and dependable operation for many years.

AFTER UNPACKING:

- Shipping container:
  Save the boxes and packing in the event your unit needs to be transported for remote operation, maintenance, or service.
- The following explicit definitions apply in this manual:

Note: If disregarded, inconvenience only.
No risk of equipment damage or personal injury.

Caution: Equipment damage may occur, but not personal injury.

Accessaries

Warranty card*	1
Instruction Manual (B50-4006-00)	1
Fuse (20A) (F05-2034-05)	1
Calibration cable (E31-2154-05)	1
DC power cable (E30-1638-05)	1
7 pin DIN plug (E07-0751-05)	1
8 pin DIN plug (E07-0851-05)	1

* Included only for U.S.A.

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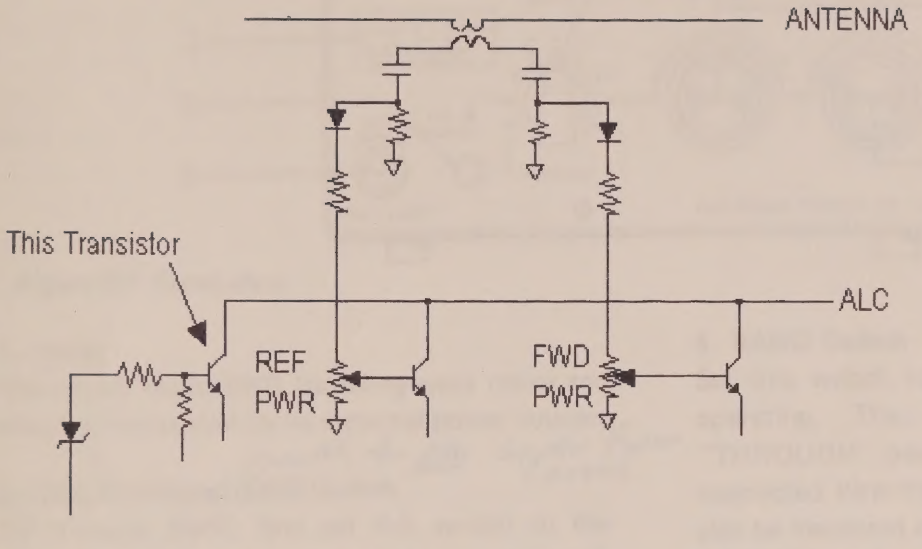
NOTE:

Before connecting or disconnecting the AC power plug, always be sure to set the POWER switches of the TS-430S and the PS-430 to OFF.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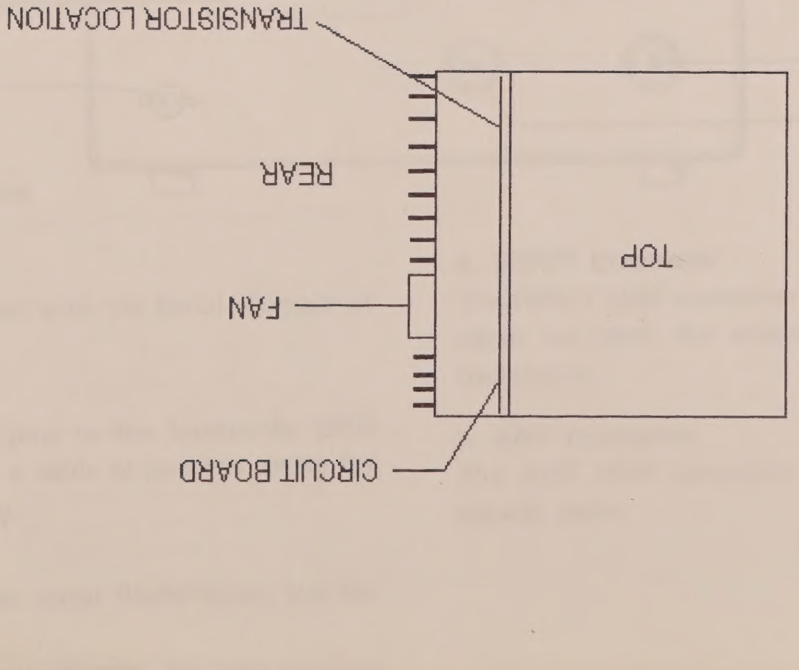
TRANSISTOR LOCATION
REAR
TOP
FAN
CIRCUIT BOARD

SECTION 2. CONTROLS AND THEIR FUNCTIONS

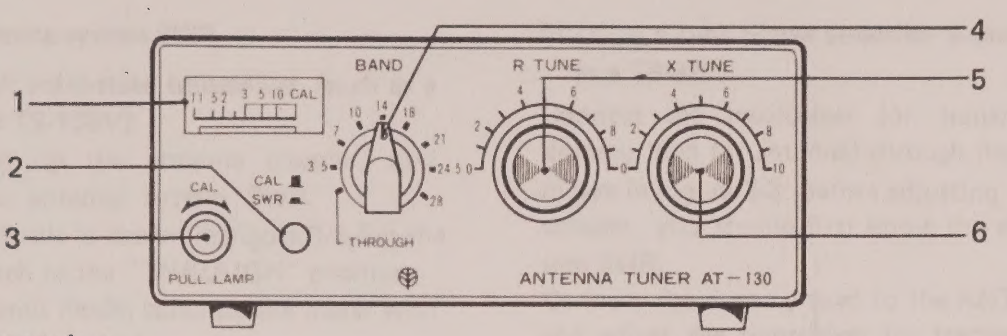

Figure 2-1 Front view

1. Meter

The meter reads SWR (standing-wave ratio) and may be illuminated by an external power source.

switch to AM Lower Power Carrier

2. CAL (Calibrate)/SWR Switch

To measure SWR, first set this switch to the CAL (▮) position. Adjust the CAL control until the meter pointer swings to the CAL line on the meter scale.

Low Power AM

Then depress the switch to the SWR (▬) position, and read the SWR. CAL on Low Power

3. CAL (Calibrate) Control/Meter Lamp Switch

Before measuring SWR, this control is used to calibrate the meter. Adjust as described above in item 2. The meter lamp lights when the control is pulled ON. 1.1 @ 28.700

SWR on ~~[illegible]~~ Low Power

4. BAND Switch

Set this switch to the band in which you are operating. The BAND switch also has a "THROUGH" position at which the antenna is connected directly to the transceiver. SWR can also be measured at the THROUGH position.

CAUTION: DO NOT operate the band switch while transmitting. Equipment damage WILL occur.

5. R TUNE

The R TUNE adjusts the resistive component of antenna impedance.

6. X TUNE (Transmit Tuning) Control

The X TUNE adjusts the reactive component of antenna impedance.

ADJUST SWR IN AM at 28.500 X tune, for Lowest 1.3

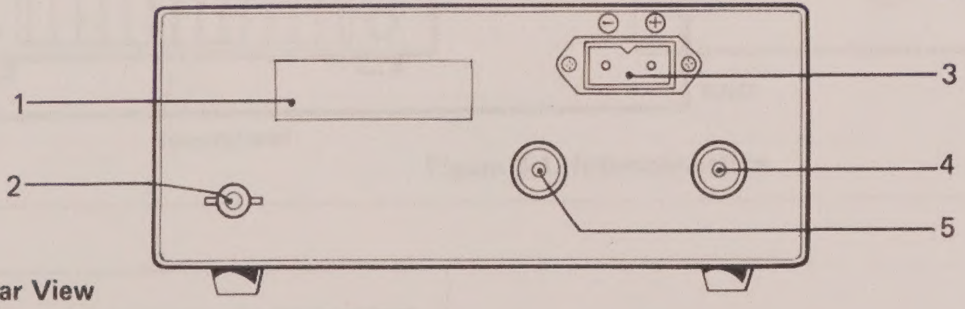

Figure 2-2. Rear View

1. Serial No. Plate

This plate is stamped with the Serial Number of your unit.

2. GND post

Connect the GND post to the transceiver GND stud. Use as short a cable as possible, using the supplied ground lug.

3. 12V DC

Accepts 12V DC for meter illumination. Use the supplied plug.

NOTE: Viewed from the rear, the right terminal is POSITIVE.

4. INPUT Connector

The INPUT UHF connector accepts the HF input signal fed from the antenna connector on the transceiver.

5. ANT Connector

The ANT UHF connector accepts the antenna coaxial cable.

SECTION 3. OPERATION

Measuring antenna system SWR

(i) Using an all solid-state transceiver (such as a TS-130S or TS-130V)

Before setting up the antenna coupler, first determine the antenna system SWR.

a. Set the controls as shown in Figure 3-2. Set the BAND switch to the "THROUGH" position.

b. In the transmit mode, calibrate the meter with the calibration control.

c. Depress the CAL/SWR switch to the SWR (▂) position and read SWR. If the SWR is lower than 1.5:1 the antenna system impedance is sufficiently matched for practical use. If above 1.5:1, tune the system.

NOTE: **In the event of too high an SWR (over 10:1), check the antenna system for breaks or a short circuit.**

(ii) Using a tube power amplifier transceiver (such as a TS-820)

Connect the transceiver (or transmitter) and dummy load (or antenna) through the AT-130 as shown in Figure 3-3. Before adjusting the antenna coupler, you should first know the antenna system SWR.

Connect the dummy load to the ANT connector and adjust the transceiver (or transmitter) final tuning. Then, replace the dummy load with the antenna and measure the antenna-system SWR.

NOTE: **During antenna measurements, your transceiver may be operating under heavy loading conditions.**
Your signal may also interfere with other stations. Use the least amount of power possible, and complete measurements as quickly as possible.

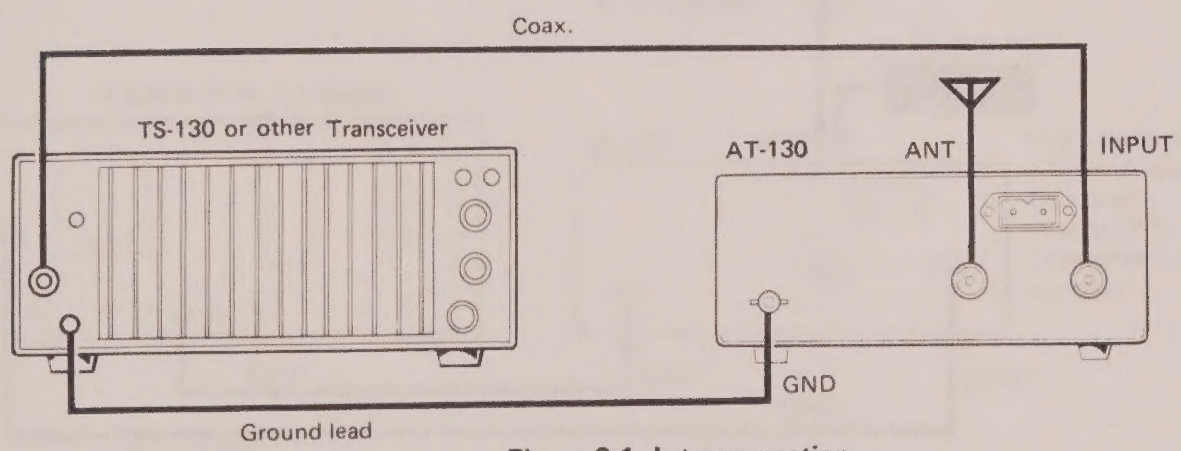

Figure 3-1. Interconnection

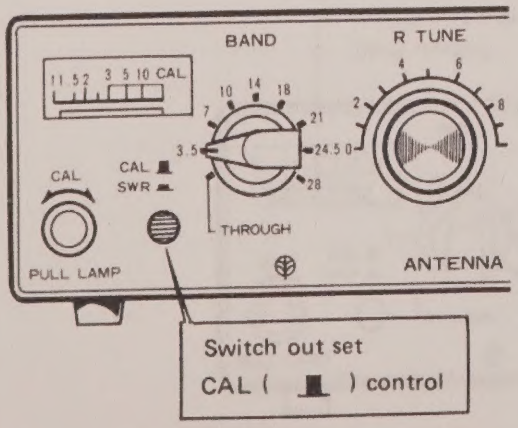

Figure 3-2. Switch Settings

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https://archive.org/details/kenwoodhftransce00unse_3

Adjusting the Antenna Coupler

The antenna coupler is used to match a transmitter to an antenna system when its SWR is too high (i.e., greater than 1.5:1 SWR).

a. Place the BAND switch to the same band setting as your transceiver (as shown in Figure 3-4).

b. Set the CAL/SWR switch to the CAL (▮) position.

c. Transmit and adjust the CAL control so the meter indicates CAL.

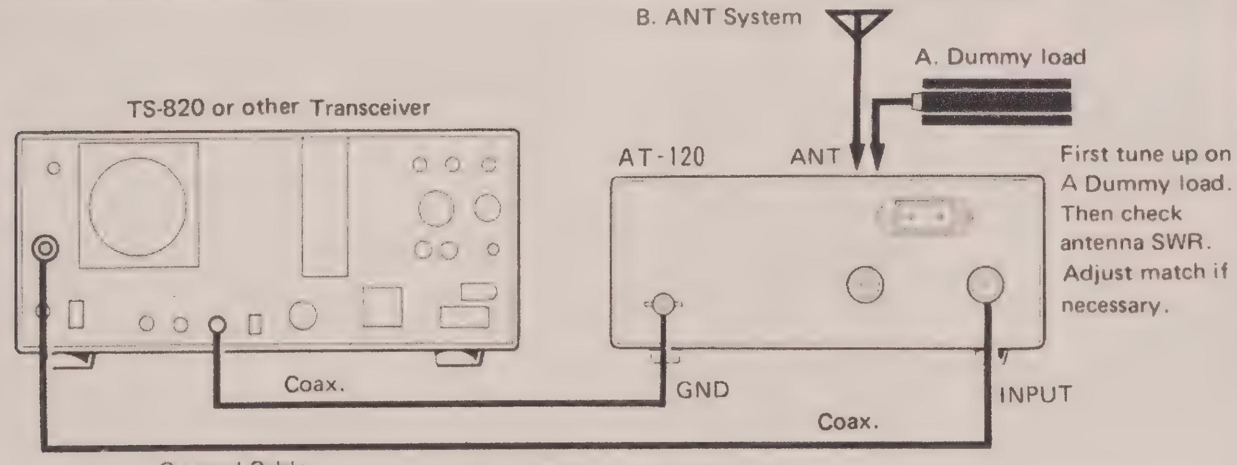
d. Place the CAL/SWR switch in the SWR (▬) position.

e. Now you will measure the reflected power. Adjust the R TUNE and X TUNE controls alternately for a good minimum meter indication. Reflected power will be close to zero as a good match is achieved.

Table 3-1 shows approximate control positions for coupler adjustment.

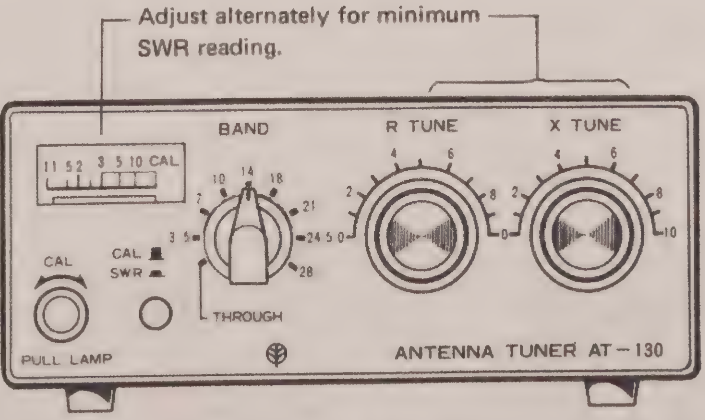
Table 3-1

BAND (MHz)	R TUNE	X TUNE
3.50	5.1	3.2
7.00	6.2	5.5
10.10	6.7	6.1
14.00	7.7	7.3
18.10	7.3	7.4
21.00	8.0	8.0
24.90	8.4	8.5
28.50	8.4	8.6



First tune up on A Dummy load. Then check antenna SWR. Adjust match if necessary.

Figure 3-3. Inter Connection



Adjust alternately for minimum SWR reading.

Figure 3-4.

COMMUNICATIONS MICROPHONE

MC-60A

INSTRUCTION MANUAL

■ FEATURES

The MC-60A microphone is designed expressly for use with your amateur communication system. It provides excellent performance when used with any KENWOOD transceiver, thereby upgrading your existing system.

The zinc die-cast base offers high stability, and is complete with a feather-touch PTT switch, rocker UP/DOWN switch, an impedance selector switch and a built-in preamplifier.

NOTE: For UP/DOWN switch operation, refer to your transceiver's manual.

CAUTION:

1. The microphone is constructed of precision parts. Do not open the microphone, as it may result in serious damage.
2. The microphone is sensitive to shock and vibration Treat it gently.

■ INSTALLATION

1. **Battery Installation** (Fig. 2)
   1. Remove four screws as shown.
   2. Install two alkaline AA cells (not NiCd). Observe polarity.
   3. Reassemble base unit.

   NOTE: 1. Radios with power available at the mic connector (for autopatch microphones) will not require batteries.

   2. The preamp on/off switch is located on the underside of the base unit. The preamp is on in the forward switch position

2. **Connection to your transceiver.**
   1. Slide the microphone into the plastic bracket.
   2. Connect the short base mounted cable to the rear of the microphone.
   3. Connect the retractile cord from the base to the transceiver
   4. The microphone may also be used separate from the base unit, by connecting the retractile cord directly to the mic. However, the preamp is located in the base unit. Preamped operation is not possible with a direct transceiver hookup.
   5. The MC-60A is supplied with a standard PG-4C 8 pin to 8 pin retractile cord. For radios with a four pin mic connector, use a PG-4A (4 pin to 8 pin) option cord For radios with a six pin mic connector, use a PG-4B (6 pin to 8 pin) option cord

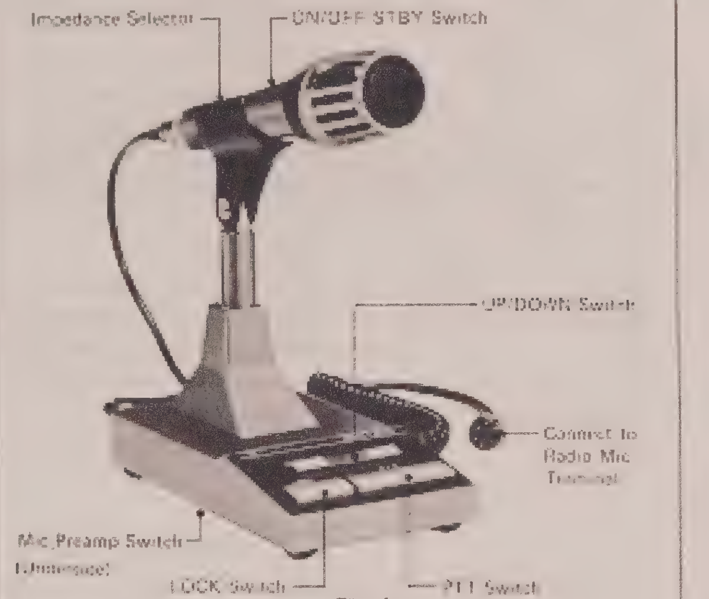


Fig. 1.

■ OPERATION

The MC-60A is equipped with a PTT switch for easy transmit/receive changeover. The PTT switch can be locked, if desired by pressing the Lock key. To unlock the switch, simply press the Lock key once again. The Mic on/off, Lock, and PTT switches are all in parallel.

- **Connection**

  To operate the microphone without using the stand, connect the retractile cord directly to the microphone, and use the slide-switch on the microphone for transmit/receive changeover.

- **Impedance selection**

  The microphone impedance is selectable between 500Ω and 50kΩ by using the slide-switch on the microphone regardless of whether the stand is used. Most Trio-Kenwood HF products are 50kΩ. Some will operate from 500–50kΩ. All VHF and UHF mobile radios are 500Ω impedance.

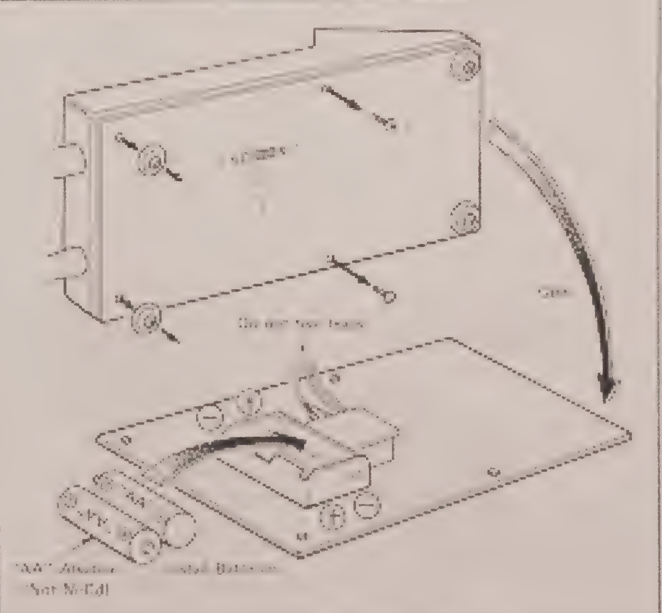
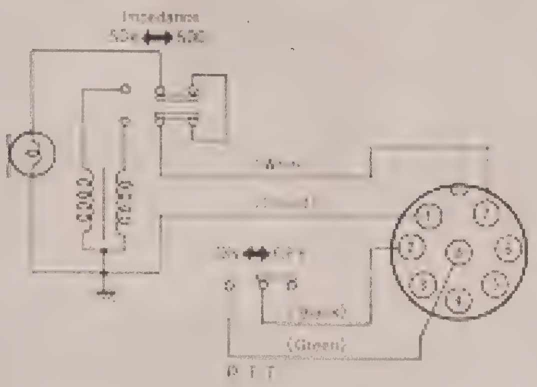
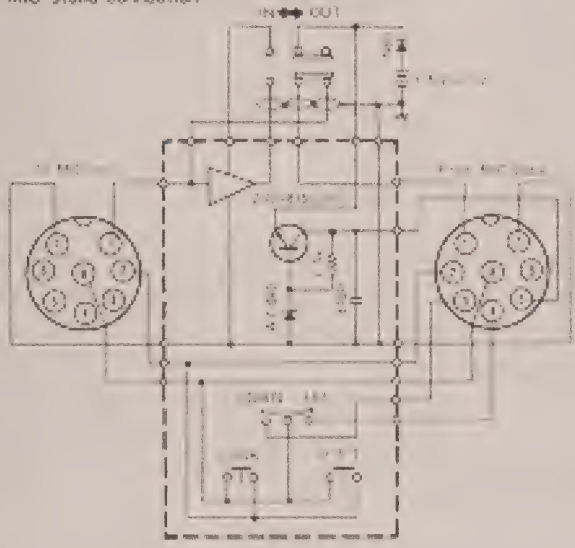


Fig. 2 Battery installation

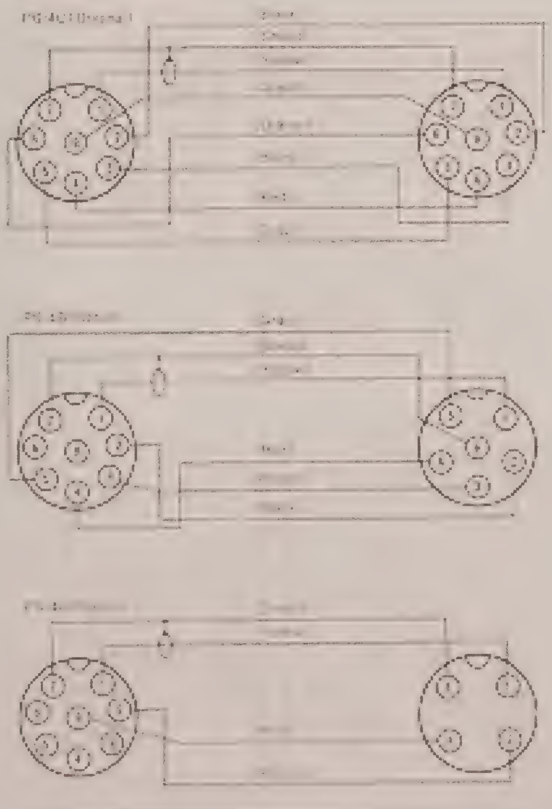
MIC unit connection



MIC stand connection



MIC cable connection



- **UP/DOWN switch**

  The UP/DOWN switch on the base is used to select the transceiver's operating frequency.

- **Microphone Preamp**

  This microphone may be used with any Trio-Kenwood radio. It is intended especially for FM and SSB mobile radios. The preamp is controlled by the bottom mounted switch on the base unit. Sliding the switch forward places the preamp on. Sliding the switch to the rear bypasses the preamp and disconnects the batteries. With the preamp switch on, power is always on so the microphone may be used with VOX operated equipment.

  NOTE: To conserve battery power, turn the preamp off when not in use. (The amplifiers draw approximately 1 ma.)

■ SPECIFICATIONS

Type:	Communication type dynamic microphone with PTT circuit.
Element:	Moving coil type, unidirectional
Impedance:	Dual impedance (1000 Hz) 50 kΩ± 30%, 500 Ω± 30% slide switch selectable
Sensitivity:	(0 dB = 1V/μ BAR, 1000 Hz)
Microphone	−54.5 dB ± 3dB/50 kΩ −71.0 dB ± 3dB/500Ω
Preamp out	−56.0 dB ± 3dB/50kΩ −71.0 dB ± 3dB/500Ω
Preamp in	−50.5 dB ± 3dB/50kΩ −59.0 dB ± 3dB/500Ω
Frequency response:	
Microphone, or Preamp off	150 Hz − 10 kHz (−6 dB)
Preamp in	200 Hz − 7 kHz (−6 dB)
Recommended operating distance to mic.:	10 cm (4") minimum

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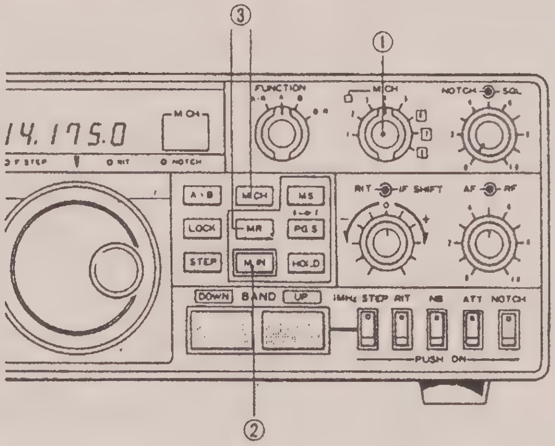

① Select a memory channel.
② Store the memory.
③ These switches are for recalling memory.

① Einen Speicherkanal wählen.
② Speichern.
③ Diese Schalter dienen zum Abrufen der Speicherung.

① Sélectionner une mémoire de canal.
② Mise en mémoire.
③ Ces touches servent á rappeler la mémoire.

① Seleccionar un canal de memoria.
② Almacenar la memoria.
③ Estas llaves son para llamar la memoria.

① Selezionare un canale di memorizzazione.
② Premere per memorizzare.
③ Usare questi interrutori per richiamare la memoria.

OPERATION

● M.CH (Memory channel) operation

The TS-430S has eight memory channels. The memory permits input of both frequency and mode, and this data will be permanently retained (by the built-in lithium battery).

1. The M.CH switch selects the desired channel from CH 1-8.

2. When the M.IN switch is depressed, a "beep" sounds, indicating memory input.

3. There are two recall modes for memory channel contents.

* Depress the M.CH switch. Any one of eight channels can be selected by the M.CH switch as a fixed (non-tunable) frequency and mode.

* Depress the MR switch. The channel designated by the M.CH switch is recalled to the VFO for tunable operation. The memory contents are not changed.

● Festfrequenzbetrieb

Der TS-430S verfügt über acht Speicherplätze, die sog. Speicher- oder Fest-Kanäle, in denen nicht nur die Betriebsfrequenzen, sondern auch die Betriebsart gespeichert werden können. Die eingebaute Lithium-Langzeitbatterie dient zur Speicherhaltung und verhindert ein Löschen der gespeicherten Informationen.

1. Den gewünschten Speicherkanal (1-8) mit dem Kanal-Drehschalter (M. CH.) vorwählen.

2. Bei Betätigung der Eingabe-Taste (M. IN) ertönt ein Pfeifton mit dem die Eingabe der Frequenz und Betriebsart quittiert wird.

3. Die in den Festkanälen gespeicherten Informationen lassen sich wie folgt abrufen:

* Schalter M. CH. drücken. Jeder der acht Speicherkanäle läßt sich mit dem Kanal-Drehschalter (M. CH.) als Festfrequenzkanal mit vorgegebener Betriebsart abrufen.

* Taste MR drücken. Der mit dem Kanal-Drehschalter (M. CH.) vorgewählte Kanal wird zur Feinabstimmung auf den VFO übertragen, der Speicherinha eibt jedoch e. en.

● Fonctionnement de la mémoire de canal (M. CH)

Le TS-430S comporte huit mémoires de canaux. La mémoire permet d'introduire la fréquence et le mode, et ces données restent enregistrées de manière permanente (grâce à la pile aulithium intégrée).

1. Le sélecteur M. CH permet de sélectionner le canal choisi parmi les huit existants.

2. Lorsque la touche d'entrée de mémoire (M. IN) est enclenchée, un "bip" résonne, ce qui indique la mise en mémoire.

3. Il y a deux modes de rappel pour le contenu des mémoires de canal.

* Appuyer sur la touche M. CH. On peut sélectionner n'importe lequel des huit canaux à l'aide du sélecteur M. CH en tant que fréquence fixe (non accordable) et mode.

* Appuyer sur la touche MR (mémoire). Le canal choisi par le sélecteur M. CH est rappelé vers le VFO pour l'opération d'accord. Le contenu de la mémoire ne change pas.

● Operación del canal de memoria (M.CH)

El TS-430S tiene ocho canales de memoria. La memoria permite la entrada de frecuencia y modo, y estos datos se retendrán permanentemente gracias a una pila de litio incorporada.

1. La llave M.CH selecciona el canal deseado desde CH1 a CH8.

2. Cuando se presione la llave M.IN, se oirá un sonido que indicará la entrada en memoria.

3. Hay dos modos de llamada de los contenidos del canal de memoria.

* Presionar la llave M.CH. Cualquiera de los ocho canales podrá seleccionarse con la llave M.CH, como frecuencia fija (no puede sintonizarse) y modo.

* Presionar la llave MR. El canal designado por la llave M.CH se llama al VFO para efectuar la operación sintonizable. Los contenidos de la memoria no se cambian.

● Uso dei canali di memorizzazione (M. CH)

Il TS-430S è dotato di otto canali di memorizzazione. È possibile memorizzare la frequenza e il modo; questi dati vengono conservati da una batteria al litio incorporata.

1. Usare l'interruttore M. CH per selezionare un canale di memorizzazione, da CH 1 a 8.

2. Premendo l'interruttore M. IN, si sente un bip, a riconferma dell'avvenuta memorizzazione.

3. Il contenuto di un canale di memorizzazione può essere richiamato in due modi:

* Premere l'interruttore M. CH. Si può così selezionare uno qualsiasi degli otto canali, per mezzo dell'interruttore M. CH. La frequenza e il modo richiamati sono fissi (e cioè non sintonizzabili).

* Premere l'interruttore MR. Il canale designato dall'interruttore M. CH viene richiamato al VFO e può essere sintonizzato. Il contenuto della memoria non viene comunque modificato.

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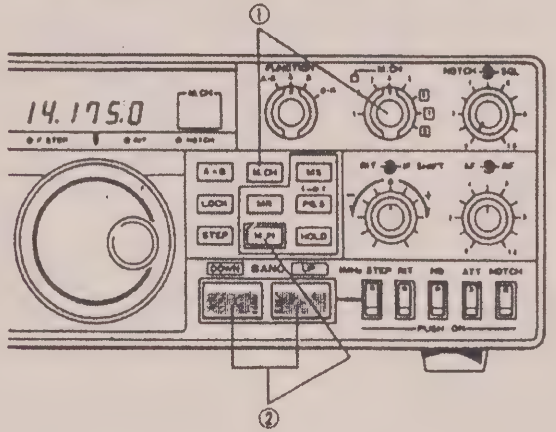


① Depress the M.CH switch, and place the M.CH switch to the unwanted memory channel.
② Simultaneously depress the BAND switch, and the M.IN switch.

① Den M.CH-Schalter drücken und den M.CH-Schalter auf den nicht gewünschten Speicherkanal stellen.
② Den BAND-Schalter und den M.IN-Schalter gleichzeitig drücken.

① Appuyer sur la touche M.CH, puis placer le sélecteur de mémoire de canal sur celle qui est à effacer.
② Appuyer simultanément sur le commutateur de gamme d'ondes (BAND) et sur la touche M.CH

① Presionar la llave M.CH y ponerla en el canal de memoria indeseado.
② Presionar simultáneamente la llave M.CH y la llave M.IN.

① Premere l'interruttore M.CH e portare il comando M.CH sul canale il cui contenuto deve essere cancellato.
② Premere l'interruttore di banda e M.IN contemporaneamente.

ERASE

● Erasing an unwanted frequency from memory

Unwanted memory content can be erased.

1. Depress the M.CH switch, and select the channel to be erased with the M.CH switch.
2. Simultaneously depress the BAND switch (either UP or DOWN), and the M.IN switch.
3. The display will clear, and only the decimal points will display. All mode indicators will remain off.

● Löschen gespeicherter Festkanal-Frequenzen

Die in einem Speicherkanal gespeicherte, nicht mehr gewünschte Frequenz wird wie folgt gelöscht:

1. Schalter M. CH. drücken und den zu loschenden Kanal mit dem Kanal-Schalter (M. CH.) anwählen.
2. Die Tasten BAND (UP oder DOWN) und M. IN gleichzeitig drükken.
3. Die Digitalanzeige wird bis auf die Dezimalpunkte gelöscht. Die Betriebs-
arten-Leuchtanzeige bleibt dunkel.

● Effacement d'une fréquence superflue de la mémoire

Le contenu superflu de la mémoire peut être effacé.

1. Appuyer sur la touche M. CH (mémoire de canal) puis sélectionner le canal devant être effacé avec cette même touche.
2. Appuyer simultanément sur le commutateur de gamma d'ondes (BAND, UP ou DOWN) et sur la touche M. IN (entrée de mémoire).
3. L'affichage est alors effacé, et seuls les points décimaux restent à l'affichage. Tous les indicateurs de mode restent éteints.

● Borrado de una frecuencia indeseada de la memoria

Los contenidos de la memoria que no se dessen pueden borrarse.

1. Presionar la llave M.CH y seleccionar el canal que quiera borrarse con la llave M.CH.
2. Presionar simultáneamente la llava BAND (bien UP o DOWN) y la llave M.IN.
3. La indicación se borrará y solamente quedarán indicados los puntos decimales. Todos los indicadores de modo permanecen apagados.

● Cancellazione di una memorizzazione

Per cancellare una memorizzazione, procedere come segue:

1. Premere l'interruttore M. CH e selezionare il canale di memorizzazione di cui si vuole cancellare il contenuto per mezzo dell'altro comando M. CH.
2. Premere l'nterruttore BAND (UP o DOWN) e l'interruttore M. IN contemporaneamente.
3. La visualizzazione del quadrante viene cancellata, lasciando solo il simbolo della virgola. Tutti gli indicatori del modo rimangono spenti.

KENWOOD

FM-430

FM UNIT

The Model FM-430 is specifically designed to be used in combination with Transceiver TS-430/TS-670 for operation on FM mode.
It can easily be mounted in the transceiver using attaching screws and connectors.
The FM-430 is factory wired and adjusted, and requires no further attentions.

Note: For the FM-430 installation in the TS-670, refer to the TS-670 instruction manual on page 28.

The following instruction is only for installation of FM-430 in the TS-430.

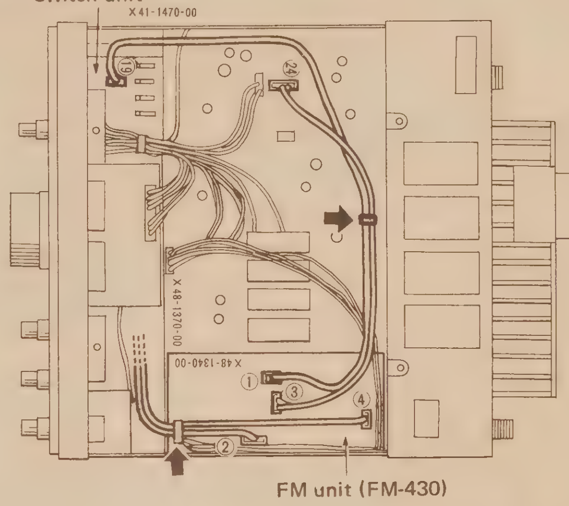
INSTALLATION OF FM-430 (For the TS-430)

1. Remove the upper and lower covers of the transceiver.
2. Mount the FM-430 on the right upper side of the transceiver using attaching screws.
3. Connect the leads from the FM-430 connectors to the transceiver as follows:
   - * Connect the leads from the connector (1) to the connector "19" of the switch unit (X41-1470-00).
   - * Connect the leads from the connector (3) to the connector (24) of the IF unit (X48-1370-00).
   - * Arrange the leads from the connector (2) (4) on the bottom of the transceiver passing through the side of the switch unit. Connect the leads from the connector (2) to the connector (20) of the RF unit (X44-1510-00). Similarly, connect the leads from the connector (4) to the connector (6) of the RF unit.
4. Bind the leads as illustrated using the supplied four vinyl ties.
5. Reinstall the bottom cover.
   Reconnect the speaker lead, and reinstall the top cover.

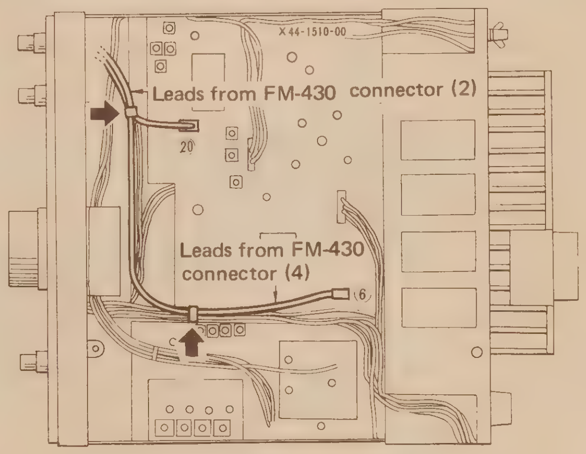
CONNECTION OF FM-430 CONNECTORS (For the TS-430)

FM-430 connector No.	TS-430 connector No. and unit
(1)	Switch unit (X41-1470-00) 19
(2)	RF unit (X44-1510-00) 20
(3)	IF unit (X48-1370-00) 24
(4)	RF unit (X44-1510-00) 6

TS-430 top view



TS-430 bottom view



Installation of FM-430
(For the TS-430)

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KENWOOD

FM-430

FM UNIT

■概　要

FM－430は、TS－430に装着することにより、FMモードの運用を可能にするユニットです。また、配線およびハンダ付けは全て完了していますので、ユニットをネジ止めし、コネクターを接続すれば、無調整で所定の性能が得られます。

■FM－430の取付け方

❶セットの上ブタおよび底板を取りはずしてください。

❷セットの右上面にあるユニット取付けスペースにFM－430をネジで確実に取付けてください。

❸FM－430からのコネクターをそれぞれ接続してください。

- ①コネクターからの線をVOX-VRのあるスイッチユニット(X41－1470－00)の⑲コネクターに接続します。
- ③コネクターからの線をIFユニット(X48－1370－00)の㉔コネクターに接続します。
- ②、④コネクターからの線を先に接続したスイッチユニットの横を通して底面に出します。そして②コネクターからの線をRFユニット(X44－1510－00)の⑳へ、④コネクターからの線を⑥へ接続します。

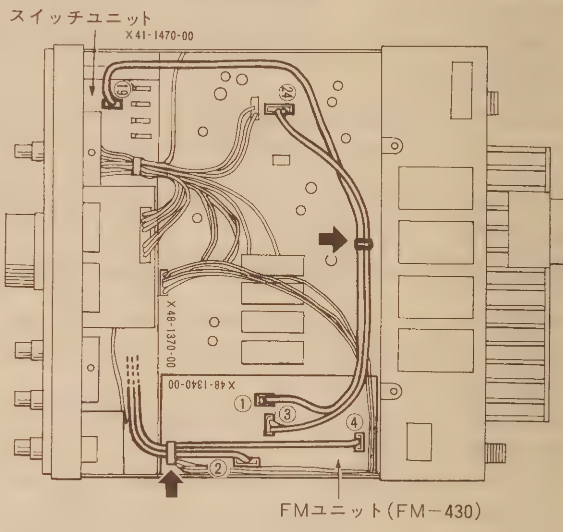
❹付属のビニールバンドでハーネスを束ねてください。(図の4ヶ所)

❺スピーカーコードをコネクターに接続し底板、上ブタを取付けて完成です。

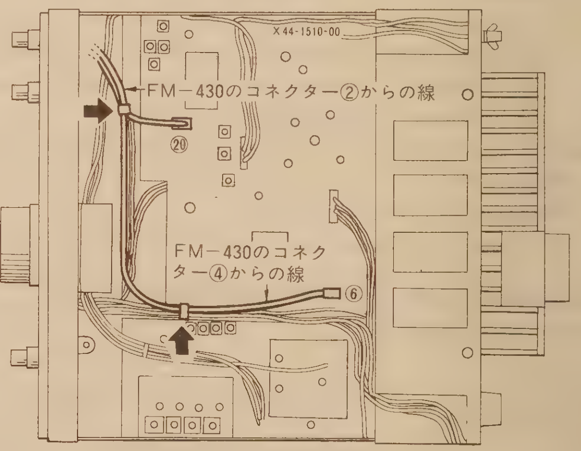
FM－430のコネクター接続

FM 430の コネクター NO.	接続先ユニット名およびコネクターNO.
①	スイッチユニット(X41－1470－00)…⑲
②	RFユニット　(X44－1510－00)…⑳
③	IFユニット　(X48－1370－00)…㉔
④	RFユニット　(X44－1510－00)…⑥

TS-430上面



TS-430底面



FM-430の取付け方

■トリオ株式会社
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電話 (03)(486)5515

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SECTION 1. SPECIFICATIONS

[GENERAL]
Transmitter Frequency Range: 160, 80, 40, 30, 20, 17*, 15, 12*, 10 meter Amateur bands
Receiver Frequency Range: 150 kHz to 30 MHz
Mode: A3J (LSB, USB), A1 (CW), A3 (AM), F3 (FM)
Antenna Impedance: A3J (LSB, USB), A1 (CW), A3 (AM), F3 (FM............ OPTION)
Power Requirement: 12.0 to 16.0 V DC (13.8 V nominal)
Power Consumption: 20A approx. in transmit mode
1.2A approx. in receive mode
Dimensions: 270 (10.6)W × 96 (3.8)H × 257 (10.1) D mm (inch)
Weight: 6.5 kg (14.3 lbs.)

[TRANSMITTER]
Final Power Input:

Mode Band	SSB	CW	FM	AM
160m – 15m band	250WPEP	200WDC	–	60W
10m band	250WPEP	200WDC	120W	60W

Modulation: SSB = Balanced Modulation
FM = Variable Reactance Direct Shift
(with FM-430 optional accessory)
AM = Low Level Modulation (IF stage)
Carrier Supression: Better than 40 dB
Unwanted Sideband Suppression: Better than 50 dB
Harmonic Content: Less than –40 dB
Maximum Frequency Diviation (FM): ±5 kHz (with FM-430 optional accessory)
Microphone Impedance: 500Ω to 50 kΩ

[RECEIVER]
Circuitry: SSB, CW, AM = Double conversion Superheterodyne
FM = Triple Conversion Superheterodyne
Intermediate Frequency: 1st IF = 48.055 MHz
2nd IF = 8.83 MHz
3rd IF = 455 kHz (FM only)
Sensitivity:

Frequency Mode	150kHz – 500kHz	500kHz – 1.8MHz	1.8MHz – 30MHz
SSB/CW(10 dB S/N)	Less than 1 µV	Less than 4 µV	Less than 0.25 µV
AM(10 dB S/N)	Less than 13 µV	Less than 40 µV	Less than 2.5 µV
FM (30 dB S/N)	–	–	*Less than 1 µV
FM (12 dB SINAD)	–	–	*Less than 0.7 µV

* with FM-430 optional accessory

Image Ratio: More than 70 dB (1.8 to 30 MHz)
More than 50 dB (FM-3rd image ratio)
IF Rejection: More than 70 dB (1.8 to 30 MHz)
Selectivity:

Selectivity Mode	–6 dB	–60 dB
SSB/CW	2.4 kHz	4.4 kHz
AM *1	6 kHz	12 kHz
FM *2	15 kHz	32 kHz

* 1 with YK-88A optional filter
* 2 with FM-430 optional accessory

Frequency Stability: Better than ± 30×10^{-6} (0°C to +50°C), Within ±200 Hz from 1 to 60 minutes after turn-on: within ±30 Hz any 30 minute period thereafter
Frequency Accuracy: Better than 10×10^{-6}
RIT Variable Range: More than ± 1 kHz
Audio Output Impedance: 4Ω to 16Ω
Audio Output Power: More than 1.5W across 8Ω (at 10% distortion)

* Will transmit on the new 17 and 12 meter bands, Lockout factory installed to prevent accidental transmission. (Note for U.S.A. only)

Note: Circuit and ratings subject to change without notice due to developments in technology.

SECTION 2. FEATURES

150 kHz – 30 MHz GENERAL COVERAGE RECEIVER

ALL MODE OPERATION

Operating mode include USB, LSB, CW, and AM, both transmit and receive, with FM optionally available using the FM-430 frequency modulation unit (installs easily inside the transceiver). Mode selection is made by front panel mode keys with adjacent LED indicators.

SUPERIOR RECEIVER DYNAMIC RANGE

The receiver front-end has been carefully designed to provide an exceptionally wide dynamic range, through the use of 2SK125 junction-type FET's in the RF amplifier and balanced mixer circuits.

DUAL DIGITAL VFO's

- 10 Hz step dual digital VFO's include band and mode information, allowing split frequency or cross-band operation.
- A STEP switch is provided to permit tuning in 10 Hz (10 kHz/revolution of the tuning knob), or 100 Hz (100 kHz/revolution) steps.
- An A = B switch is provided to bring the idle VFO to the active VFO mode and frequency.
- A VFO LOCK switch is provided.
- The RIT control allows shifting the receive frequency in either VFO or memory mode operation.

EIGHT MEMORY CHANNELS

- Each memory stores frequency, mode, and band information.
- The memory CH 8 stores both a receive and a transmit frequency for split-frequency memory operation.
- A front panel MR switch is provided to allow the operator to operate each of the eight memories as an independent VFO, or as a fixed frequency.

LITHIUM BATTERY MEMORY BACK-UP

All memory and VFO information is backed-up by an internal lithium battery (estimatd 5 year life).

MEMORY SCAN

Scans only those memory channels in which data is stored. The scanning time is approximately 1.8 sec. for each channel, with a HOLD switch provided to interrupt the scan.

PROGRAMMABLE BAND SCAN

Scans within the programmed band width.
Memory channel 6 establishes the lower band scan limit, memory channel 7 the upper limit. The HOLD switch interrupts the scan. Scan speed is externally adjustable.

IF SHIFT CIRCUIT

The apparent IF passband may be shifted to place interfering signals outside the passband, while keeping the desired signal optimally placed for best signal-to-noise ratio.

TUNABLE NOTCH FILTER

SPEECH PROCESSOR

The speech processor uses an audio compression amplifier and change in the ALC time constant, resulting in substantially increased "talk-power".

ALL SOLID-STATE

The TS-430S runs 250W PEP input on CW, on 160-10 meters. In the AM mode, it runs 60W input, all bands. In the FM mode (optional FM-430 unit installed), it runs 120W input. A built-in cooling fan, plus other protection circuitry assures maximum final amplifier reliability. Both the receiver and the solid-state wide band final amplifier requires no tuning.

NOISE BLANKER

An effective noise-blanker eliminates pulse-type interference such as ignition noise.

RF ATTENUATOR

The carefully designed receiver front-end includes a switchable 20 dB RF attenuator for intermodulation distortion rejection.

VOX CIRCUIT

Both VOX and push-to-talk operation available. VOX gain, delay, and anti-VOX controls are located on top of the cabinet, for easy adjustment. Semi-break-in operation available in CW, using the built-in sidetone oscillator.

RUGGED CONSTRUCTION AND STYLING

The TS-430S is styled to enhance the appearance of any fixed or mobile station, while providing maximum ease of operation through a functional layout of the controls.

BUILT-IN SQUELCH CIRCUIT EFFECTIVE FOR ALL MODES

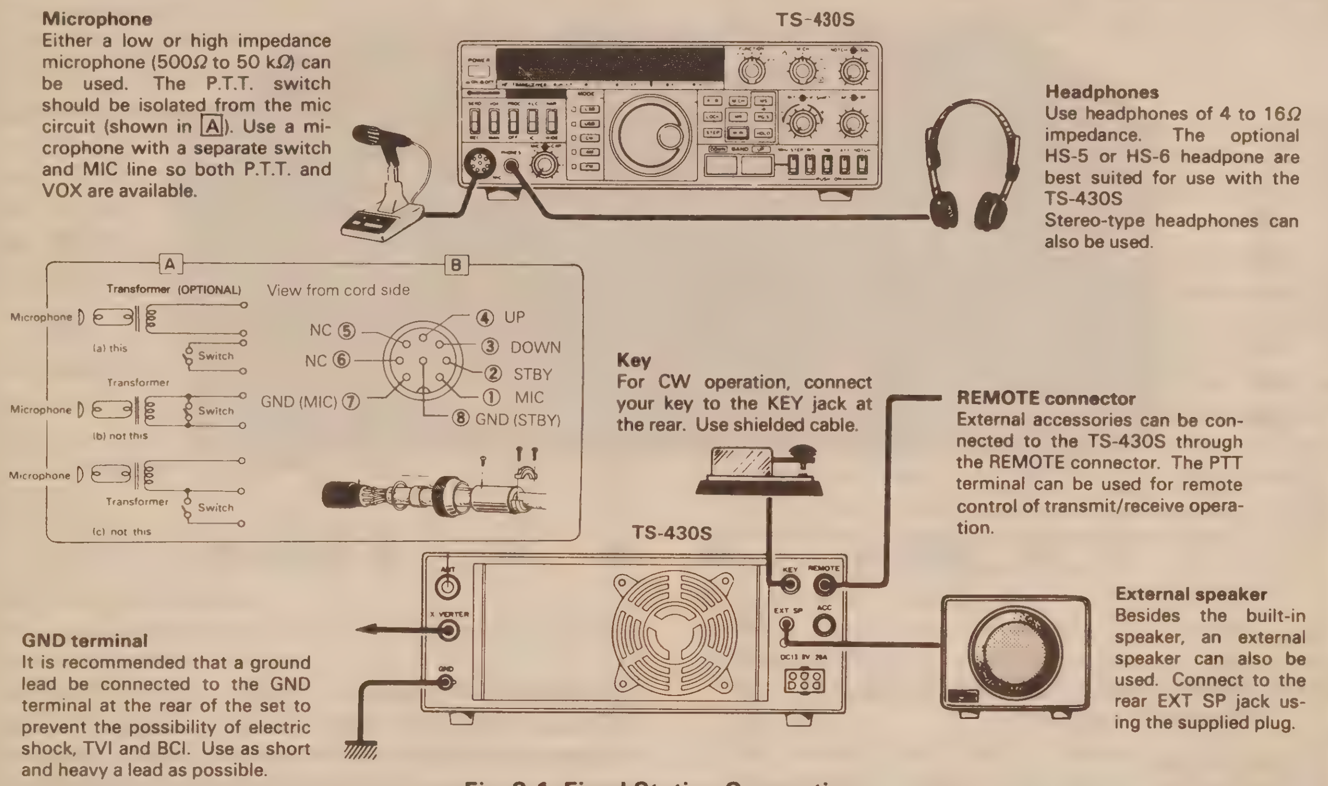
OTHER FEATURES

- Meter reads S in receive, IC or ALC in transmit.
- An audible "beep" from the speaker confirms key entry operations.
- Indicators provided for VFO A/B, ON AIR, F.LOCK, F.STEP, RIT, NOTCH, M.CH, and MODE.
- VFO dial drag externally adjustable.
- Remote terminal provided for linear amplifier control.
- Accessory terminal provides band information.
- Transverter terminal is provided on the rear panel.

SECTION 3. PREPARATION FOR USE

INTERCONNECTION

Connect the transceiver as illustrated in Fig. 3-1, 3-2.



Microphone
Either a low or high impedance microphone (500Ω to 50 kΩ) can be used. The P.T.T. switch should be isolated from the mic circuit (shown in A). Use a microphone with a separate switch and MIC line so both P.T.T. and VOX are available.

Headphones
Use headphones of 4 to 16Ω impedance. The optional HS-5 or HS-6 headpone are best suited for use with the TS-430S
Stereo-type headphones can also be used.

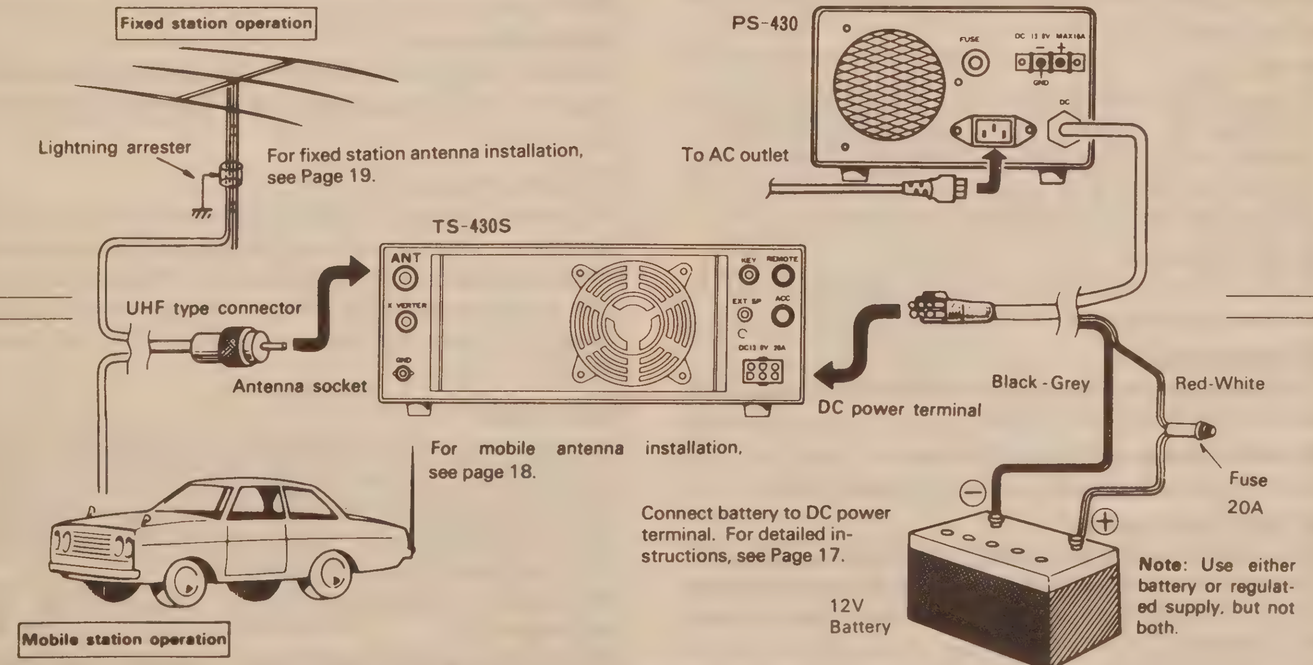
Key
For CW operation, connect your key to the KEY jack at the rear. Use shielded cable.

REMOTE connector
External accessories can be connected to the TS-430S through the REMOTE connector. The PTT terminal can be used for remote control of transmit/receive operation.

GND terminal
It is recommended that a ground lead be connected to the GND terminal at the rear of the set to prevent the possibility of electric shock, TVI and BCI. Use as short and heavy a lead as possible.

External speaker
Besides the built-in speaker, an external speaker can also be used. Connect to the rear EXT SP jack using the supplied plug.

Fig. 3-1 Fixed Station Connection



For fixed station antenna installation, see Page 19.

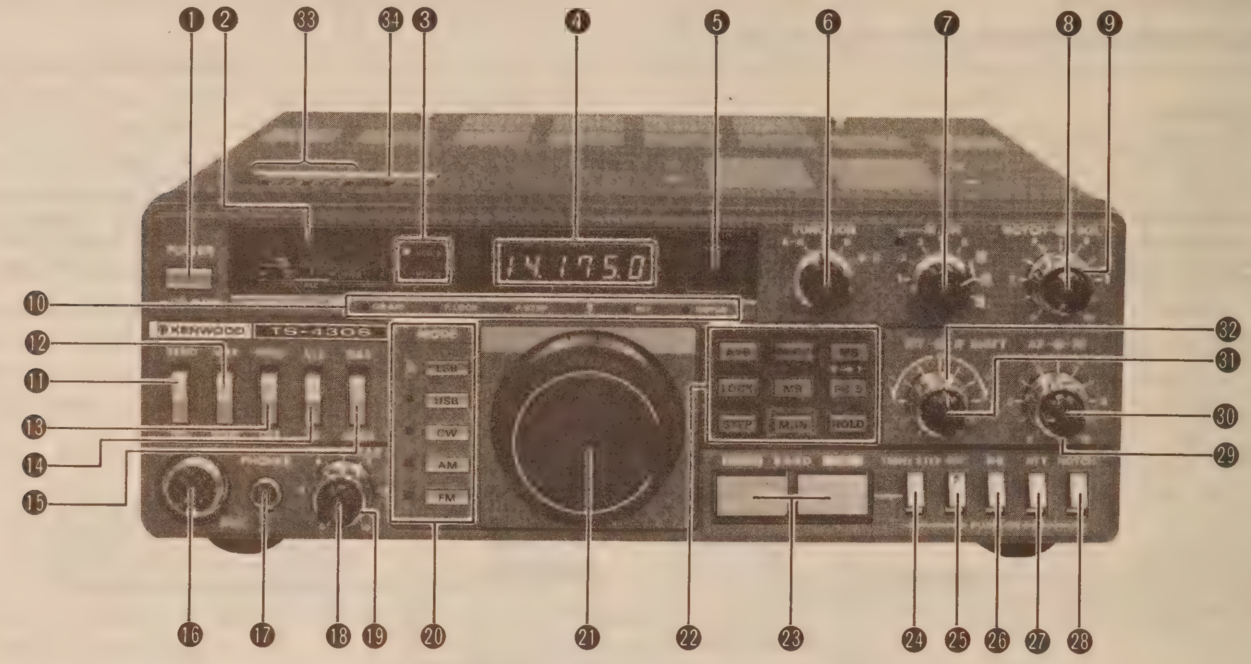
For mobile antenna installation, see page 18.

Connect battery to DC power terminal. For detailed instructions, see Page 17.

Note: Use either battery or regulated supply, but not both.

Fig. 3-2 Antenna and Power Supply Connection for TS-430S

SECTION 4. CONTROLS, INDICATORS AND CONNECTORS



4.1 FRONT AND TOP PANELS (TS-430S shown)

① POWER switch

This switches the TS-430S ON and OFF.

Before operating the POWER switch, confirm that the VOX ⑫ is off, and the STANDBY switch ⑪ is set to the reception mode (REC).

② METER

The meter has three functions, two being selected by the METER switch. In receive the meter is automatically an S-meter showing receive signal strength on a scale of 1 – 9, +20, +40 and +60 dB. In transmit, the meter shows IC or ALC level, depending on METER switch position.

③ VFO indicators

VFO A indicator lights when VFO A is operating. VFO B indicator lights when VFO B is operating.

④ Digital display

The digital display indicates true operating frequency in all modes to an accuracy of 100 Hz.

⑤ M.CH (Memory Channel) display

Indicates memory channel 1 – 8 or P, program scan.

⑥ FUNCTION switch

This selects the VFO which will control receive and transmit frequencies. Select position A or B for normal operation. A-R and B-R are used for split frequency or cross-band operation.

A-R: VFO A operates during reception and VFO B during transmission.

A: VFO A operated, VFO B stands by.

B: VFO B operates, VFO A stands by.

B-R: VFO B operates during reception and VFO A during transmission.

⑦ MEMORY CH selector

This selects one of the eight memory channels. To write in a frequency depress the M.IN switch and the displayed frequency will store in the selected channel. To recall from a memory channel, select the channel and depress the MR switch.

⑧ NOTCH control

Turn the NOTCH switch ㉘ ON to activate the notch filter. Adjust the notch frequency to null beat (carrier interference) signals.

⑨ SQUELCH control

The squelch control is used to eliminate noise during no signal time. This control may be adjusted clockwise until the noise disappears (threshold level). The control functions for all modes; SSB, AM and CW. In the FM mode, squelch functions only when the optional FM-430 is installed.

⑩ Indicators

ON AIR indicator: This lights during transmission mode.

F.LOCK (Frequency lock): Lights when the F.LOCK switch ㉒ is ON, indicating the VFO operating frequency is locked.

F.STEP (Frequency step): Lights when the STEP switch ㉒ is ON, indicating a fast VFO tuning rate.

RIT (Receiver Incremental Tuning): Indicates the RIT switch ㉗ is ON.

NOTCH: Indicates the notch filter is operating and lights when the NOTCH switch ㉘ is ON.

⑪ STAND-BY switch

This switch selects:

REC: The transceiver is receiving unless the microphone PTT switch or the VOX circuit is activated.

SEND: Locks the unit in transmit. Transmission is locked out (reception only) if the selected transmission frequency is outside the amateur radio bands, or the final stage thermal-protects (is deactivated due to excessive heat-sink temperature).

⑫ VOX switch

Turn this switch on to activate the VOX (Voice Operated Xmit) during SSB, AM or FM operation or to allow semi-break-in CW operation.

⑬ PROC (Speech processor) switch

This switch is used during SSB or AM operation. At switch ON the speech processor will be activated, increasing average "talk power".

⑭ METER switch

During transmission, the meter switch determines meter function. The switch selects between:

ALC – The meter monitors the output of the final stage power amplifier during transmission. During SSB operation, adjust the MIC control so that the meter pointer is within the ALC zone. Similarly, adjust the CAR control for CW operation. ALC does not indicate in the AM or FM mode.

IC – The meter monitors final stage collector current.
12 – 19A is normal, 17A typical.

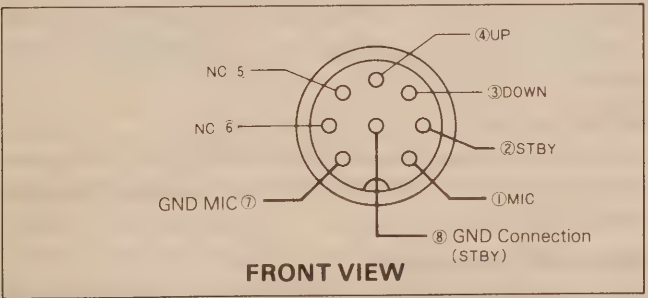
⑮ NAR/WIDE switch

This switch selects receive IF bandwidths when optional filters are installed.

The WIDE position provides the same IF bandwidth for both CW and SSB. For the NARROW position, optional filters are available for both CW and SSB. In the AM mode, the SSB filter is on in the narrow position.

⑯ MIC (Microphone) connector (8-pin)

Microphone audio input. Frequency UP/DOWN control and PTT lines are included. The MC-42S or MC-60A microphones (optional) are recommended. MIC connector pin assignments are shown below.



FRONT VIEW

⑰ PHONES jack

The headphone jack allows use of 4 – 16 ohm (or greater) impedance headphones. HS-5 or HS-6 optional headphones provide optimum results. Stereo-type headphones can also be used. Headphones will disable the internal or external speaker.

⑱ MIC (Microphone gain) control

This control adjusts microphone amplifier gain for SSB and AM operation. In the SSB mode, adjust for an on-scale ALC reading at voice peaks. For low power operation, adjust this control below the ALC range. For AM mode adjustment, see "AM transmission" page 11.

⑲ CAR (CARRIER LEVEL) CONTROL

This controls carrier level during CW operation. Adjust the carrier level for an on-scale ALC meter reading. For low-power operation, adjust this control below the ALC range.

⑳ MODE switches and indicators

These switches are used to select the mode; USB, LSB, CW, AM or FM (optional). Each indicator lights corresponding to the mode.

㉑ Tuning Knob

This knob controls the dual digital VFO's which operate in 10 Hz step at 10 kHz turn for normal slow tuning, or with the STEP switch depressed, at 100 Hz step for fast tuning.

㉒ Keyboard

- A = B switch: Depress this switch to equalize the frequency and mode of the idle VFO to that of the operating VFO.
- LOCK switch: This electrically locks the VFO frequency. When this switch is on, the tuned frequency does not vary when either the tuning knob or BAND switch is operated. This is convenient when operating on the same frequency for extended periods. The RIT does operate with the LOCK switch on. The F.LOCK indicator lights to show operation.
- STEP switch: Used to select the VFO tuning rate.
- M.CH (Memory channel) switch: Used to select a memory channel as a fixed frequency. With this switch ON, the channel number is displayed on the M.CH display ❺.
- MR (Memory recall) switch: Depress to recall a selected channel from memory to the VFO for tunable operation.
- M.IN (Memory in) switch: Depress to store the displayed VFO frequency in to a selected memory channel.
- MS (Memory scan) switch
  Depress this switch for memory scan operation.
  Only channels with stored data are scanned. Scan rate is fixed at approximately 1.8 sec./channel.
- PG.S (Program scan) switch
  Depress this switch to scan from the frequency stored in CH 6 to the frequency stored in CH 7. Programmed Scan Speed is adjustable. However, the presence of a signal does not stop the scan.
- HOLD (Scan hold) switch
  Depress this switch to stop the scan operation. Resetting this switch to OFF resumes the scan operation.

㉓ BAND selector switches

Used to select the amateur or frequency band. When the UP or DOWN switch is pressed, the band changes by one step.

㉔ 1 MHz step switch

When depressed ON, this allows the band switch to raise or lower the frequency in 1 MHz steps within the transceivers full frequency range. At OFF (out) the Band switch steps the amateur band.

㉕ RIT switch
This push switch turns the RIT (Receiver Incremental Tuning) circuit ON and OFF. With the switch depressed, the circuit is activated and the RIT indicator is illuminated, allowing the receive frequency to be shifted by about 1 kHz independent of the transmit frequency by using the RIT control. The RIT circuit is turned OFF when the switch is out.

㉖ NB (Noise Blanker) switch
This switch is used to reduce pulsating type ignition noises usually emitted from motor vehicles. Power-line, QRM and atmospheric "white" noise will not operate the noise blanker.

㉗ RF ATT (Attenuator) switch
With this switch ON, a 20 dB attenuator is inserted in the antenna circuit, protecting the RF amplifier and mixer from overload on strong input signals.

㉘ NOTCH switch
This switch controls the NOTCH circuit and indicator.

㉙ RF GAIN control
This adjusts receiver RF amplifier gain. Turn fully clockwise for maximum gain and a correct S-meter reading.

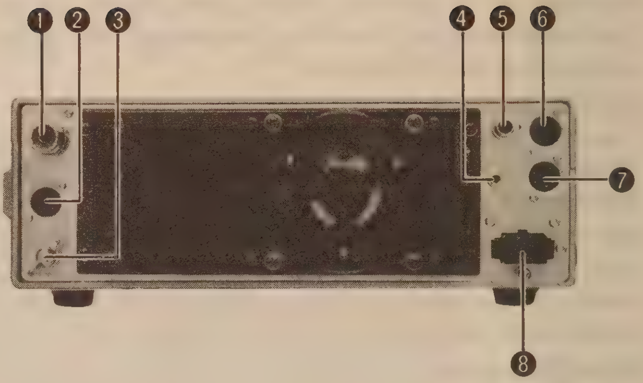
㉚ AF GAIN (Audio Frequency) control
This control adjusts the receiver audio output level. Volume increases as the control is turned clockwise.

㉛ RIT control
When the RIT switch is ON, this will vary the receive frequency by about 1 kHz. When the control is set to the "0" center position, there is no frequency shift.

㉜ IF SHIFT control
By using this control, the IF crystal filter center frequency can be shifted about 1 kHz, allowing adjustment of tone quality, or eliminating interference from adjacent frequencies. For normal operation, this control should be set to the center "0" position (at the detent).

㉝ VOX controls
VOX GAIN: This controls sensitivity of the VOX (Voice operated Transmit) circuit. Adjust the gain for consistent key-over by voice, but not back ground noise.
DELAY control: This controls hold time for VOX, or CW semi-break-in operation. Adjust to hold the transmitter on between words, at a normal speech, or keying rate.
ANTI-VOX control
This control is used to adjust the VOX system so that it is not false tripped by sound from the speaker.

㉞ PG.SCAN (Program scan) control
This adjusts program scan speed.



4.2 REAR PANEL

❶ ANT (Antenna) connector
This UHF connector should be attached to a suitable antenna for transmitting and receiving. The antenna cable should be 50-ohm coax, terminated with a PL-259 connector.

❷ X. VERTER (transverter) terminal
This 8 Pin DIN connector is used to interface a VHF or UHF transverter.
See page 23 for pin-outs.

❸ GND (Ground) terminal
To prevent electric shock, as well as RFI and BCI, connect the transceiver to a good earth ground.

❹ EXT. SP (External speaker) jack
The receiver audio output can be connected through this jack to an external 4 to 16 ohm speaker. The internal speaker is disconnected when an external speaker is connected.

❺ CW key jack
Using shielded line, connect a key to this 1/4" phone jack for CW operation. Key open-terminal voltage is approximately 9V DC.

❻ REMOTE connector
This connector is used to interconnect a linear amplifier or other accessory item.

❼ ACC (Accessory) connector
Refer to page 22.

❽ DC POWER CONNECTOR
This is used to connect the DC power supply.

SECTION 5. OPERATION

Note: Ⓣ denotes transmit mode; Ⓡ denotes receive mode.

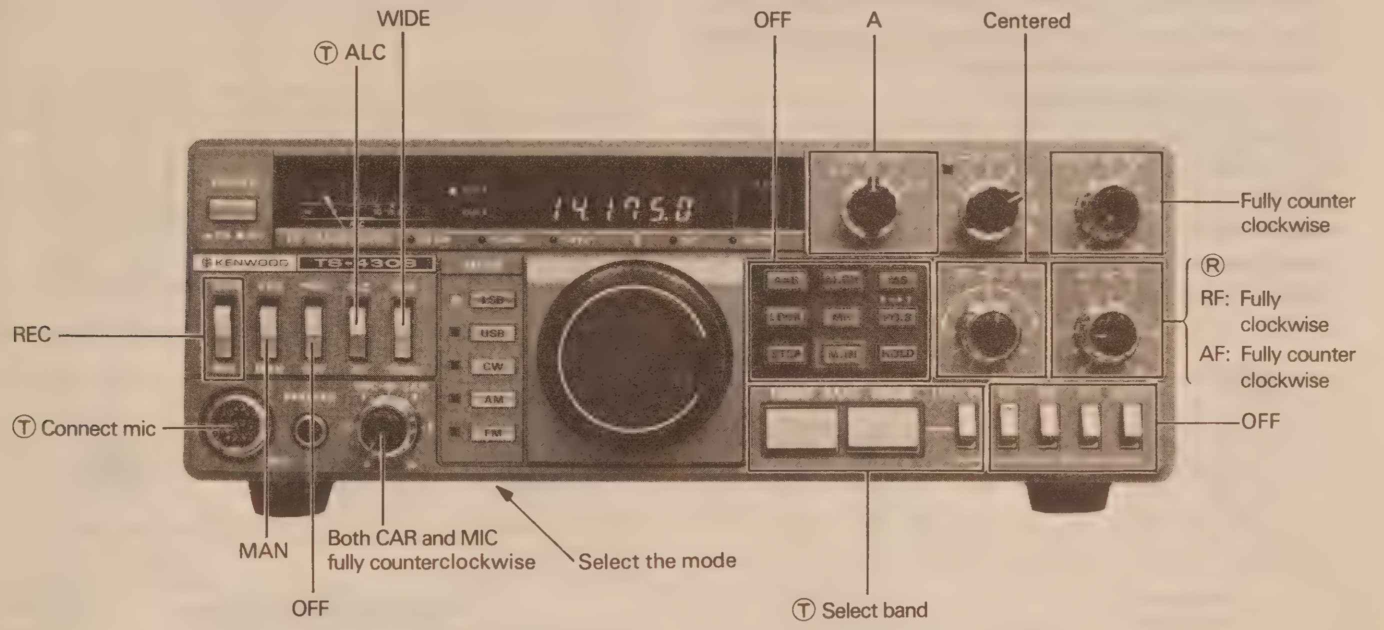


Fig. 5-1 Initial Control Settings

5.1 RECEPTION

5.1.1. RECEPTION

First connect the antenna, microphone and key. Then, set the controls and switches referring to Fig. 5-1.

Acertain that the TS-430S is ready for operation, then turn the POWER switch ON. The meter and digital display will illuminate, indicating the transceiver is in operation. The transceiver is fully solid-state, allowing reception as soon as the POWER switch is switched ON.

Advance the AF GAIN control clockwise until some receiver noise is heard from the speaker. Turn the main tuning control so the desired signal can be heard clearly.

5.1.2. RF ATT SWITCH

The input to the receive RF amplifier is attenuated approximately 20 dB, providing distortion-free reception. This feature may be used in cases of receiver overload, caused either by a strong local signal, or during weak signal reception when a strong adjacent signal may blank the receiver.

5.1.3. NB SWITCH

The TS-430S has a sophisticated noise blanker designed to reduce ignition-type pulse noise. The noise blanker is particularly important for mobile operation. When necessary, activate the noise-blanker by depressing the NB switch ON.

5.1.4. RF GAIN CONTROL (Fig. 5-2)

For normal operation, this control should be turned fully clockwise for maximum sensitivity. Receive sensitivity is reduced by turning the control counterclockwise.

Adjust the RF GAIN so the S-meter does not show excessive deflection. This minimizes noise during reception and allows the S-meter to indicates signal peak (or a little below that point). Noise is markedly reduced when signal is absent.

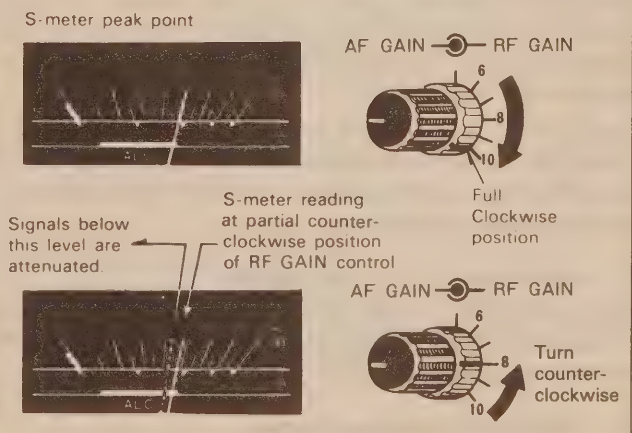

S-meter peak point
AF GAIN
RF GAIN
6
8
10
Full Clockwise position
Signals below this level are attenuated.
S-meter reading at partial counter-clockwise position of RF GAIN control
AF GAIN
RF GAIN
6
8
10
Turn counter-clockwise
ALC

Fig. 5-2 RF GAIN Control Operation

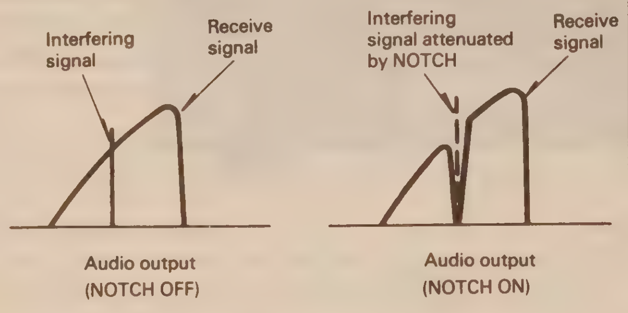
5.1.5.1. SQUELCH

To eliminate receiver noise at the no-signal condition, slowly advance the squelch clockwise until the noise just disappears (threshold point).

The squelch will open and the speaker will operate when a signal is received. If the signal is weak or fades, readjust the squelch for consistent reception.

5.1.5.2. NOTCH CONTROL

If a single tone such as a CW signal is superimposed on the receive signal, turn the NOTCH ON and adjut the NOTCH control to eliminate or minimize the beat signal. A beat of approximately 900 Hz can be eliminated at the center position of the control. The NOTCH is effective between 350 and 2600 Hz.



Notch Control

5.1.6. RIT CONTROL

By using the RIT (Receiver Incremental Tuning) control, the receive frequency can be shifted by about ± 1 kHz without changing the transmit frequency.

If the frequency of the station you are working changes, your receive frequency can be reset by turning the RIT switch ON and adjusting the RIT control. Adjusting the control clockwise increases the frequency. When first calling another station, the RIT should be OFF, otherwise your transmit and receive frequency will not coincide.

5.1.7. IF SHIFT CONTROL

The IF SHIFT control is used to shift the passband of the IF filter without changing receive frequency. By turning this control in either direction, the IF passband is shifted as shown in Fig. 5-3.

The IF SHIFT is effective in eliminating interference when nearby signals are superimposed on the receive signal during either SSB or CW operation. IF SHIFT does not operate in the AM or FM modes.

(1) USB Mode (10 MHz and above)

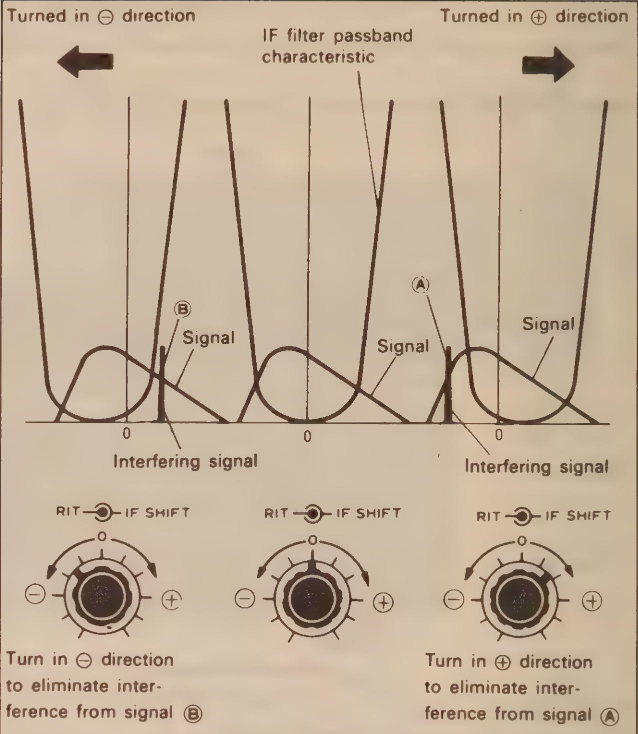
Adjust the IF SHIFT control in the + direction and lower frequencies are cut. Adjust the control in the – direction and high frequencies are cut.

(2) LSB Mode (7 MHz and below)

Adjust the control in the + direction and higher frequencies are cut. Adjust the control in the – direction and low frequencies are cut.

(3) CW Mode

By using the IF SHIFT in conjunction with the RIT, tone quality can be adjusted.



Turn in ⊖ direction to eliminate interference from signal Ⓑ

Turn in ⊕ direction to eliminate interference from signal Ⓐ

Fig. 5-3 IF Shift Control

5.1.8. NAR-WIDE switch operation

For short to medium distance communication, the WIDE position may be used for both SSB and CW operatin. For DX (long distance) communication, the NAR position will be an advantage in reducing interference.

This feature, in combination with the IF SHIFT control, will provide outstanding interference rejection. The receive IF bandwidth is 2.4 kHz in the SSB and CW wide position, 270 or 500 Hz for CW (with optional filters YK-88CN or YK-88C) and 1.8 kHz for SSB (with optional filter YK-88SN), in the NAR position.

*In the AM MODE without an optional filter, both WIDE NARROW positions are 2.4 kHz. With a YK-88A, Wide is 6 kHz, and Narrow is 2.4 kHz.

*In transmit bandwidth is automatically WIDE.

PASSBAND WIDTH (–6 dB) kHz

MODE / FILTER	CW		SSB		AM
	WIDE	NARROW	WIDE	NARROW	WIDE NAR
No optional filter	2.4	*	2.4	*	2.4
YK-88C or CN	2.4	500 or 270	–	–	–
YK-88SN	–	–	2.4	1.8	–
YK-88A	–	–	–	–	6

NOTE:

1. Without optional filters, there is no SSB or CW reception in the NAR switch position (*).
2. The NAR/WIDE switch does not function in the AM, FM mode.
3. Without an optional filter, the AM mode bandwidth is 2.4 kHz.

5.2 TRANSMISSION (Fig. 5-4)

CAUTION:

Before transmitting, be sure to connect an antenna or dummy load with a VSWR of less than 1.5:1. Never attempt to transmit with the antenna terminal left open.

When testing the transmitter, use a 50-ohm dummy load, rated at greater than 100W (TS-430S). Refer to Fig. 5-1 for initial control settings. When the TS-430S is ready for transmission, use the following procedures:

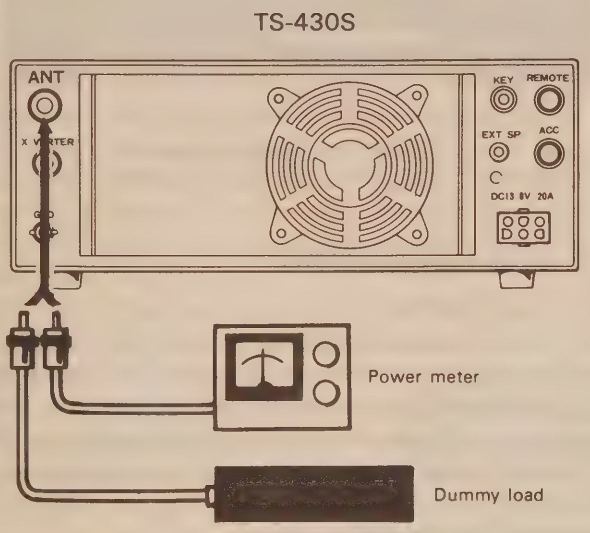


Fig. 5-4 Testing with Dummy Load or Power Meter

5.2.1 SSB Operation

1. Set the MODE switch to SSB.
2. Meter switch to ALC.
3. Standby switch to SEND.
4. Speak into the microphone and adjust the MIC GAIN for meter deflection within the ALC zone at signal peaks.
5. For QRP (Low Power) operation, use less MIC GAIN and consult your external wattmeter for output level.

5.2.2 AM Operation

1. Set the MODE switch to AM and the meter switch to IC.
2. Place the STANDBY switch to SEND and adjust the CAR control so the meter registers approximately 2/3 its usual deflection.
3. Speak into the microphone and advance the MIC GAIN control so the meter deflects only slightly at peaks. Note that excessive meter deflection indicates overmodulation.
4. The PROC may be used to provide a more constant modulation level.

5.2.3 PROC (processor) operation

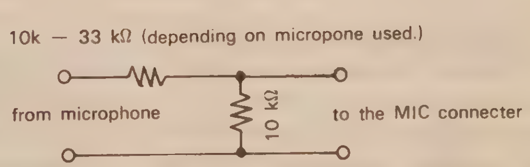
In DX (long distance) SSB or AM operation, it may be desirable to increased talk-power by using the speech processor.

The speech processor in the TS-430S combines an audio compression amplifier with changes in ALC time constant to provide extra audio punch and increases average SSB output power, while suppressing sideband splatter. To activate, turn on the PROC switch, and readjust MIC gain. Operated as described, distortion will be minimal. However, tone quality will be affected. It is therefore advisable to conduct normal operation with the processor disabled.

NOTE:

When a high-output microphone is used, input overload and distortion may result.

To prevent this, use an attenuator in the microphone circuit as shown below, or connect a 10 – 33kΩ resistor (depending on the microphone used) across the microphone input. (Mic control setting should be approximately 12 o'clock)



The MC-60A microphone is recommended (Microphone sensitivity: –55 ±3dB for approx. 5 cm distance to the mic). The MC-60A MIC AMP Switch should be set at the OUT position.

5.2.4 CW Operation

1. Set the MODE switch to CW and the meter switch to ALC.
2. Set the standby switch to SEND and adjust the CAR control so the meter deflects within the ALC zone. If a key is connected, it should be depressed during the adjustment.
3. For QRP operation, adjust the Carrier Control below the ALC point.

5.2.5 FM Operation (With FM-430 FM unit installed)

1. Place the MODE switch to FM.
2. Place the STANDBY switch to SEND.
3. Speak into the microphone. (In the FM mode, the MIC GAIN, CAR and meter switches are not used.)

5.2.6. FINAL STAGE PROTECTION

The TS-430S features a VSWR protection circuit to protect the final-amplifier transistors.

Three different protection circuits are used.

1. The final-stage transistors are protected by detecting VSWR of the antenna system and automatically lowering transmitter output power if the VSWR is too high.
2. When the heat-sink temperature rises, a detection circuit activates a cooling fan. Under normal conditions, this cooling fan sufficiently cools the heat sink.
3. The heat-sink temperature could rise abnormally during long transmissions, if the area adjacent to the heat-sink is blocked. In this case, the transmission is inhibited until the heat-sink cools to the proper temperature.

NOTES:

1. If transmitter output decreases due to activation of the protection circuit caused by high VSWR, carefully recheck and retune the antenna system.
2. When the cooling fan starts to operate, determine that adequate air flow is possible in the heat-sink area.

- **Operation of the Cooling Fan**

The cooling fan operates when the heat-sink temperature rises to approximately 50°C (122°f) and ceases to operate when the temperature decreases to normal, approximately 40°C (104°F). The heat-sink is made of die-cast aluminum and is actually the rear panel. It must be kept clear of surrounding objects to allow heat to dissipate easily.

The cooling fan is designed to operate when the heat-sink temperature is at a specific level, regardless of whether the unit is in transmit or receive mode.

5.2.7. MIC GAIN CONTROL (Fig. 5-5)

This control adjusts the microphone input level. When using the TS-430S in a voice mode, connect a microphone and set the STANDBY switch to SEND (an antenna or dummy load must be connected).

For SSB operation, set the meter switch to ALC and speak into the microphone. Adjust the MIC GAIN control so the meter does not deflect out of the ALC zone at signal peaks.

The TS-430S accepts either a low or high impedance microphone (500 Ω to 50 kΩ). When using a low impedance microphone (500 Ω) the MIC GAIN control should be advanced slightly higher than when a high impedance microphone is used, while observing the ALC meter.

- **ALC (Automatic Level Control)**

The ALC monitors the transmitter final stage output to minimize distortion in your transmitted signal. It automatically adjusts output to an optimum level.

Pointer should not deflect beyond ALC zone at signal peaks.

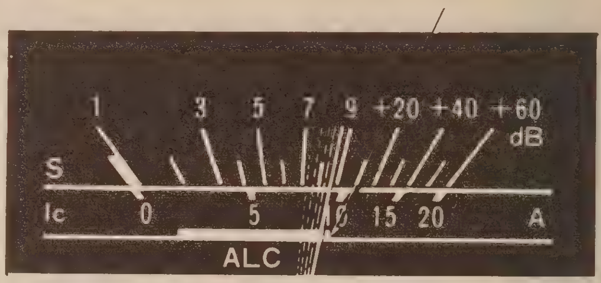


Fig. 5-5 ALC Adjustment

5.3 VOX OPERATION

5.3.1. VOX SWITCH

VOX (voice operated transmit) is used to switch the TS-430S into transmit mode by your voice. Place the VOX switch ON and speak into the microphone. The transceiver automatically switches to transmit mode (the MIC control should be adjusted in advance as explained in Item 5.2.7). Both the SEND switch and the MIC P.T.T. switch are left in the REC position.

5.3.2. VOX GAIN CONTROL

This adjusts the VOX circuit sensitivity. Speak into the microphone at a normal voice level and adjust the control. Increased sensitivity allows transmission with a lower voice level. Transceiver operating condition (receive or transmit) can be checked by the ON AIR LED.

Note that if the control is advanced too far, the VOX circuit may be "tripped" by ambient noise.

5.3.3. ANTI-VOX CONTROL

This prevents the VOX circuit from being false-tripped by sound from the speaker.

Adjust the control so the VOX will not operate at the desired speaker volume level.

5.3.4. VOX DELAY CONTROL

This control adjusts the VOX circuit transmit hold time. If the hold time is too short, the transceiver will return to receive mode as soon as you stop talking into the microphone. This can be eliminated by advancing the control. Adjust the control for comfortable operation at a normal rate of speech.

5.4 SEMI-BREAK-IN OPERATION

The TS-430S has a built-in side-tone oscillator which, used in conjunction with the VOX circuit, allows semi-break-in operation, besides the conventional (SEND switch controlled) CW operation. During semi-break-in operation, the transceiver is placed in transmit mode when the key is depressed, and returns to receive mode when the key is released. The VOX circuit is activated by the side-tone.
For semi-break-in operation, set the VOX switch ON and the MODE switch to CW. Adjust the VOX GAIN to insure that the transceiver is set in transmit mode whenever the key is depressed. Also, adjust the VOX DELAY for the desired hold time.
ANTI VOX adjustment is not required.

NOTES:

In VOX operation (semi-break-in) with VFO A/B or transmission/reception memory (CH8), the following combination is not possible by the circuit configuration.

RX	TX
ANY VOICE MODE	CW (Semi-break-in)
CW	LSB, USB (VOX) Any voice mode VOX

5.5 OPERATION WITH A LINEAR AMPLIFIER

The remote connector on the rear panel provides for interconnection with an amplifier. See the amplifier instruction manual to determine whether the linear requires a normally opened or normally closed (during receive) relay contact. Connect the amplifier control line to either pin 5 (N.C.) or pin 4 (N.O. during receive). Connect the Ground (Shield) of the Control Line to Pin 2. Connect amplifier ALC to pin 6 of the remote connector. The TS-430S output is quite adequate to drive most amplifiers to full rated output.
For full details, see section 6.8, page 22.

5.6 CW OPERATION

For CW operation, your transmit frequency should be "zero-beat" to the transmit frequency of the station you are contacting. This also allows your contact to receive your signal without having to retune his receiver. Tuning methods are detailed in the following paragraphs.

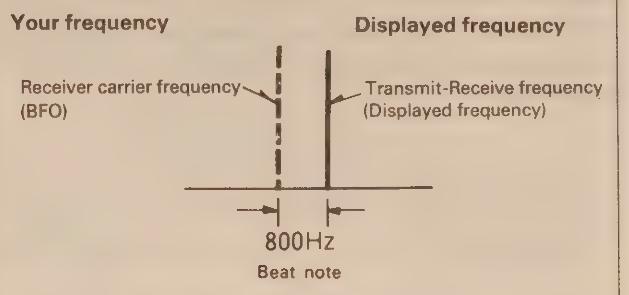

Your frequency
Displayed frequency
Receiver carrier frequency (BFO)
Transmit-Receive frequency (Displayed frequency)
800Hz
Beat note

Fig. 5-6 Tuning for CW Operation

NOTE:

1. In CW mode, transmit frequency is displayed when both transmitting or receiving.
2. During CW operation, operating the BAND switch differs from other modes; for example, pressing the UP (BAND) switch at display frequency 14,000.0 shows as follows.

14,000.0 → 14,500.0 → 18,500.0 ....→UP
10,500.0 ← 14,500.0 ←┘ DOWN

5.6.1. OPERATION WITHOUT AN OPTIONAL CW FILTER

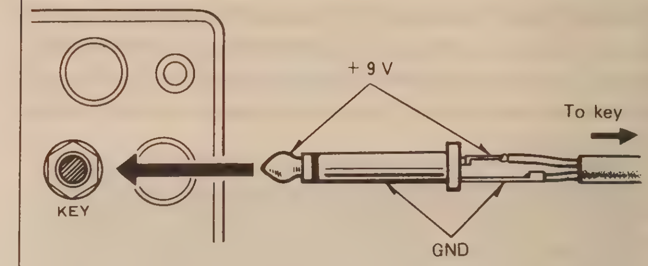
Set the IF SHIFT control to its center position and the RIT switch OFF. Adjust the main tuning control for an 800-Hz beat note and your transmit frequency will then coincide with that of your contact station ("zero-beat"). During reception, the side-tone monitor is activated by pressing down the key (VOX OFF). In this case, listen to the side-tone superimposed on the receive signal and adjust the main tuning for similar side-tone and incoming CW audio tone. By so doing, transmit frequencies will coincide.
You may now adjust the RIT for a pitch which suits your preference. If interference is encountered, adjust the IF SHIFT. For more convenient and effective CW operation, use of the optional YK-88C or YK-88CN CW crystal filter is recommended.

5.6.2. OPERATION WITH A CW FILTER

Set the IF SHIFT to its center position and the RIT to OFF. Adjust the main tuning control for maximum deflection of the S-meter. Receive signal pitch will be about 800 Hz, indicating correct tuning.

5.6.3. KEY CONNECTION

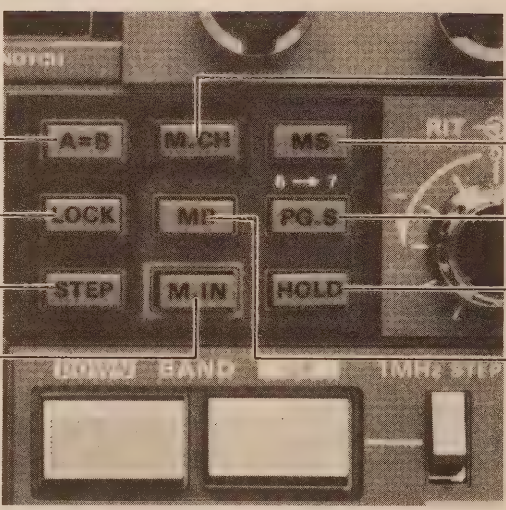
Your key should be connected as illustrated in Fig. 5-7. When using an electronic keyer, make sure that polarity is set for positive. Always use shielded line from the key to transceiver.



Before connecting, check that the polarity is correct. The KEY jack provides +9V. Use shielded cable.

Fig. 5-7 Key Connection

5.7 Keyboard function



Brings the idle VFO frequency and mode to that of the active VFO.

Locks the operating frequency.

Switches to RAPID frequency step for VFO step tuning or program scanning. Step is 10 Hz in the normal position, and 100 Hz in the ON position.

Inputs both frequency and mode into a selected memory channel (CH's 1-8).

Depress to recall a memory channel. Select the channel with the M.CH switch.

Depress to scan the memory channels.

Scans the range between CH 6 frequency and CH 7 frequency.

Holds scan. During program scan hold, frequency can be tuned with the VFO control and the mode can be switched.

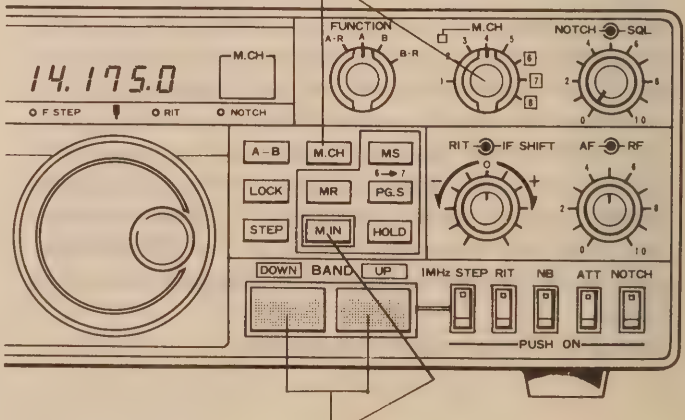
When this switch is depressed, the channel selected by the M.CH switch is recalled to the VFO for tunable operation. The mode can also be controlled when recalled by the MR switch.

● Erasing an unwanted frequency from memory

Unwanted memory content can be erased.

1. Depress the M.CH switch, and select the channel to be erased with the M.CH switch.
2. Simultaneously depress the BAND switch (either UP or DOWN), and the M.IN switch.
3. The display will clear, and only the decimal points will display. All mode indicators will remain off.

① Depress the M.CH switch, and place the M.CH switch to the unwanted memory channel.

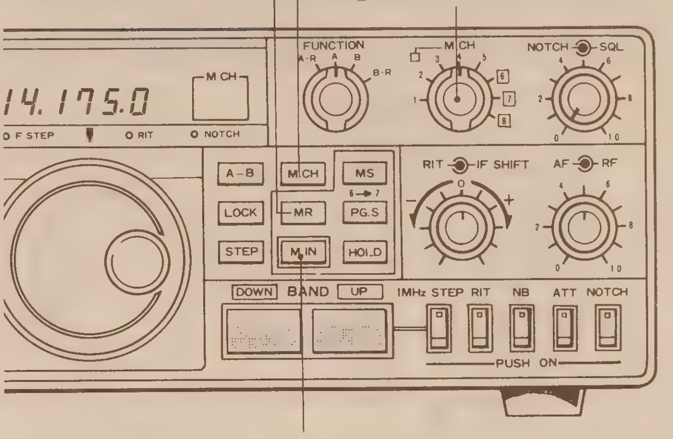


② Simultaneously depress the BAND switch, and the M.IN switch.

● M.CH (Memory channel) operation

The TS-430S has eight memory channels. The memory permits input of both frequency and mode, and this data will be permanently retained (by the built-in lithium battery).

1. The M.CH switch selects the desired channel from CH 1-8.
2. When the M.IN switch is depressed, a "beep" sounds, indicating memory input.
3. There are two recall modes for memory channel contents.
   * Depress the M.CH switch. Any one of eight channels can be selected by the M.CH switch as a fixed (non-tunable) frequency and mode.
   * Depress the MR switch. The channel designated by the M.CH switch is recalled to the VFO for tunable operation. The memory contents are not changed.



③ These switches are for recalling memory.

① Select a memory channel.

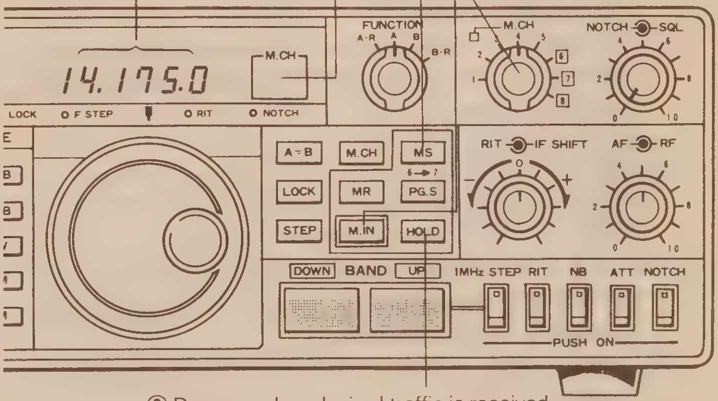
② Store the memory.

● Memory scan operation

1. Input frequencies and modes to be scanned into the memory channels.
2. Depress the MS switch. The channel number and frequency of each occupied channel is displayed. Scan interval is approximately 1.8 seconds per channel.
3. When the desired traffic is received during scan, depress the HOLD switch.
4. Scan will resume by releasing the HOLD switch.

NOTES:

1. The channel eight transmit frequency is not scanned.
2. When memories are empty, $\boxed{/}$ is displayed and there is no scan.
3. Scan is held by transmitting, and resumes when the transceiver returns to the receive mode.



② Depress to initiate memory scan.

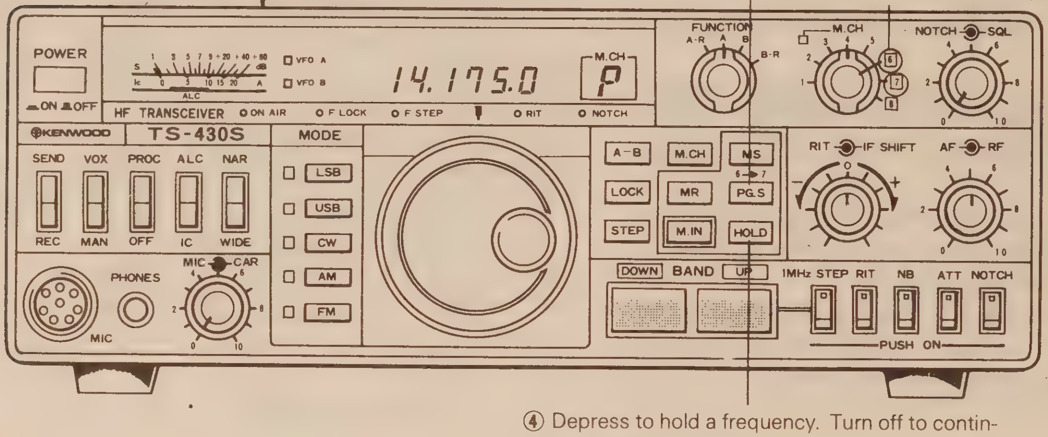
Displays the memory channel.

Displays the stored frequency.

① Stores frequency and mode.

③ Depress when desired traffic is received. Release to resume scan.

- **Program scan operation**



② When depressed, the letter $\overset{\text{M.CH}}{\boxed{P}}$ displays and scan begins.

③ This control varies the scan speed (on top cover).

① Input the lower frequency limit and mode into "6" and the upper frequency limit into "7".

④ Depress to hold a frequency. Turn off to continue scanning.

1. Program the scanning frequency range.
2. Input the lower (or upper) frequency limit and mode into CH 6 (using the M.IN switch). Then, input the upper (or lower) frequency limit into CH7.
3. Depress the PG.S switch to initiate scan. The letter P will display during program scan.
4. The scan speed is adjustable using the speed control on the top panel, along with the STEP switch. Select the scan speed appropriate for the selected frequency and mode.
5. When the desired station is received and that frequency is to be held, depress the HOLD switch. Then, adjust the VFO for best tuning. During hold, the mode may be temporarily changed. When Hold is released, the mode will revert to the original programmed mode setting after one scan cycle.
6. After the CH 7 upper (or lower) frequency limit has been reached, a "beep" sounds and the scan repeats from the CH 6 frequency.

NOTE:

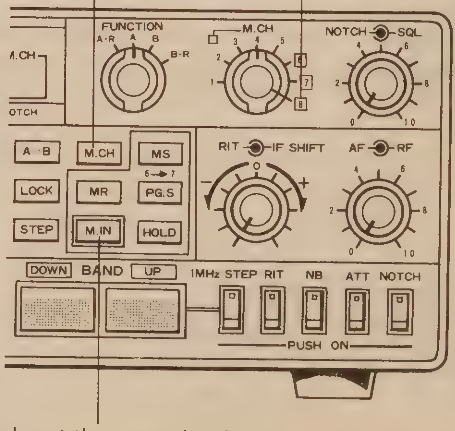
1. Program scan is from CH 6 to CH 7, only.
2. During scan, only the CH 6 mode is used.
3. During scan or scan hold, a frequency can be stored into a memory channel selected by the M.CH switch by depressing the M.IN switch.
4. When the scan is on and the STEP switch is depressed, the step is 100 Hz.
5. When CH 6 and CH 7 are empty, there can be no scan.
6. Scanning is stopped during transmit and resumed after return to the receive mode.

- **Memory CH 8 reception and transmission operation**

1. Place the M.CH switch to "8".
2. Input the reception frequency and mode using the M.IN switch.
3. The usual data entry "beep" is emitted as a pulse train. Input the transmission frequency (and mode).
4. The "beep" ceases.
5. Depress the M.CH switch. "Split" frequency operation (transmission and reception on different frequencies are programmed into CH 8.)

NOTE:

1. Different modes and/or bands can also be programmed for transmission and reception.
2. If the M.IN switch is depressed twice in succession, this memory can be used as an ordinary memory, now having the same frequency for both transmission and reception.



③ Pressing this switch TWICE allows transmission and reception on different frequencies.

① Place at "8".

② Input the reception frequency, then the transmit frequency.

5.8 MOBILE OPERATION

Being compact in design, this transceiver is ideal for mobile operation. Satisfactory mobile operation is achieved through proper power and antenna connection, and thoughtful transceiver installation and adjustment.

5.8.1. TS-430S INSTALLATION

Secure the TS-430S under the dashboard using an optional MB-430 mounting bracket as shown in fig. 5-8. As an alternative, use strapping, making sure that the TS-430S will not slip out of place while operating the vehicle.

NOTES:

1. Do not install the TS-430S near the heater outlet.
2. Allow sufficient space behind the TS-430S to ensure proper ventilation.

5.8.2. CONNECTING THE POWER CABLE

When connecting or disconnecting the power cable to or from the power connector, be sure that the power switch is always in the "OFF" position. Observe polarity of the cable. The TS-430S operates on 13.8V DC, negative ground. Battery polarity must be correct. The power cord is color coded.:

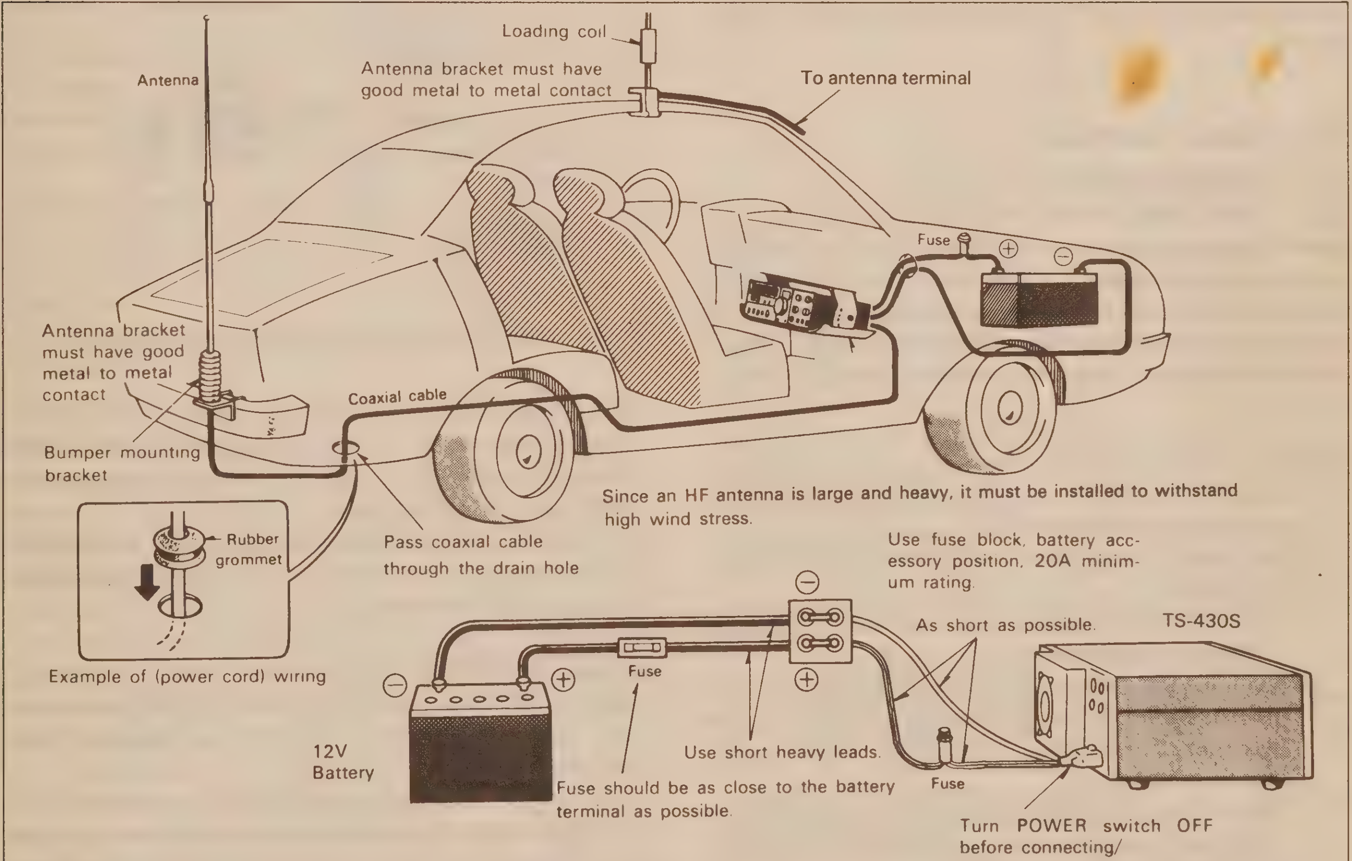

Loading coil
Antenna
Antenna bracket must have good metal to metal contact
To antenna terminal
Fuse
⊕
⊖
Antenna bracket must have good metal to metal contact
Coaxial cable
Bumper mounting bracket
Rubber grommet
Example of (power cord) wiring
Pass coaxial cable through the drain hole
Since an HF antenna is large and heavy, it must be installed to withstand high wind stress.
Use fuse block, battery accessory position, 20A minimum rating.
⊖
⊕
As short as possible.
TS-430S
⊖
⊕
Fuse
12V Battery
Use short heavy leads.
Fuse should be as close to the battery terminal as possible.
Fuse
Turn POWER switch OFF before connecting/disconnecting the power cord.

Fig. 5-8 Mobile Operation

POWER CABLE

CAUTION: Observe battery polarity.

TS-430S
Red and White + Black and gray −

Connect the TS-430S power cable to the battery terminals, with consideration to current requirements and noise prevention. The maximum current drawn by the TS-430S reaches to between 18 and 20A when transmitting. Therefore, the cable should be made as short as possible, using the specified fuse. Also, determine that the power system of the car (including the battery and generator or alternator) will handle the increased load of the TS-430S.

Route battery and ANTENNA leads away from all high voltage secondary circuits to prevent ignition noise interference.

5.8.3. MOBILE ANTENNA

(1) Antenna Installation

Use a sturdy mount for the mobile antenna since HF antennas are larger (and have more wind load) and are heavier than VHF antennas. A bumper mount is recommended for general use. The ground side of the mount must be well grounded to the car body, since the body itself functions as the ground plane for the mobile antenna. (Refer to Fig. 5-8)

NOTES:

1. Some cars have plastic bumpers. For such cars, ground the antenna mount to the body.
2. When tuning a newly installed antenna, use the following procedure:
   - Turn the CAR control fully counter-clockwise for minimum transmit power.
   - With the transceiver in transmit mode, raise transmit power output slowly by rotating the CAR control clockwise. The antenna should be adjusted with minimum power.
   - Transmitting with full power is recommended only after the antenna has been adjusted for a VSWR below 1.5:1.
3. Antenna installation is critical for successful mobile operation. For further information refer to THE RADIO AMATEUR'S HANDBOOK, RADIO HANDBOOK, or other texts.

(2) Coaxial Cable Connection

When the antenna is mounted on the vehicles bumper, the coaxial cable from the antenna can be routed through a drain hole in the trunk. When the antenna is roof mounted pass the cable between the body and door. Leave a drip-loop at the lowest point in the cable before entry into the vehicle to prevent water from entering the car.

(3) Antenna Adjustment

Some mobile antennas are not designed at 50-ohm impedance. In this case, impedance matching between the antenna and the coaxial cable (50Ω) is required. This can be achieved by using an antenna matching device or coupler.

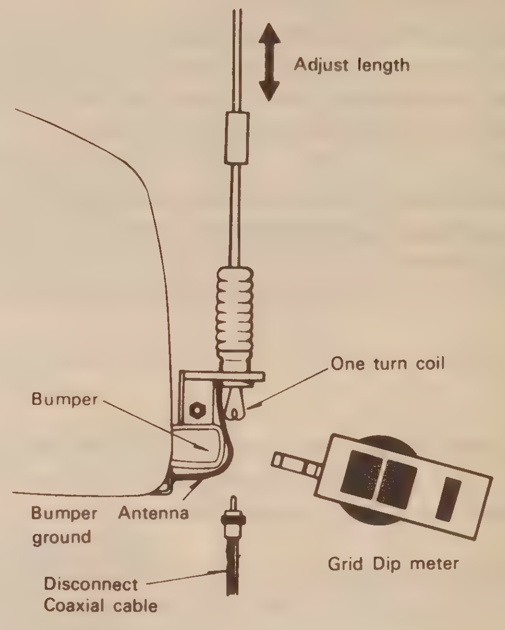


Fig. 5-9 Adjusting Antenna Resonance

The antenna to be used should first be checked with a dip meter to insure that it is designed for your operating band, then the impedance matching should be checked with an SWR meter. (See Fig. 5-9)

The VSWR should preferably be less than 1.5:1 for satisfactory operation. For antenna adjustment refer to the antenna instruction manual.

5.8.4. NOISE REDUCTION

In motor vehicles, noise is generated by the ignition system. Other sources of noise include the wiper and heater motors.

Although the TS-430S is equipped with a noise blanker to minimize ignition noise, it is imperative that some preventive measures be taken to reduce the noise to the lowest possible level.

(1) Antenna location Selection

Since ignition noise is generated by the vehicles engine, the antenna must be installed as far from the engine as possible.

(2) Antenna Matching

In general, mobile antennas have a lower impedance than the 50-ohm coaxial cable used to feed them, resulting in a mismatch between the antenna and the coax. Such trouble can be eliminated by using an antenna tuner between the TS-430S and the coaxial cable.

○ Matching Circuit Examples

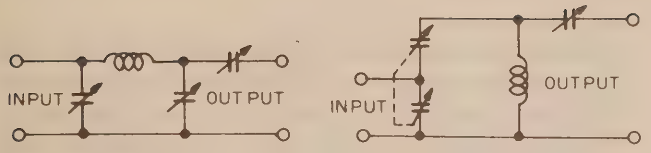


Fig. 5-10 Matching Circuits

(3) Bonding

The component parts of motor vehicles, such as the engine, transmission, muffler system, accelerator, etc., are coupled to one another at DC and low frequencies, but are isolated at high frequencies. By connecting these parts using heavy, braided ground straps, ignition noise can be reduced. This connection is called "bonding".

(4) Use ignition Suppressor Cable or Suppressor Spark Plugs

Noise can be reduced by using spark plugs with internal resistors, or resistive suppressor ignition cable.

(5) Battery Power Connection

It is recommended that battery power be supplied directly to the TS-430S from the battery terminals.

CAUTION

Disconnect the TS-430S before jump-starting or before charging the battery.

(6) Battery Capacity

The power system of a motor vehicle is comprised of a battery and an alternator (which generates power while the engine is running) to supply current to loads or to charge the battery.

Since the transceiver draws high current during transmit, care should be excersised so the power system is not overloaded. When using the transceiver, the following points should be observed from the viewpoint of battery maintenance:

1. Turn the transceiver OFF when the lights, heater, wipers and other high-draw accessories are used.
2. Avoid transceiver operation when the engine is not running.
3. If necessary, use an ammeter and/or a voltmeter to check battery condition.

5.9 FIXED STATION OPERATION

5.9.1. Power

The TS-430S requires more than 18A at 13.8 VDC when transmitting at full power. Use the model PS-430 power supply for fixed stations.

5.9.2 ANTENNAS

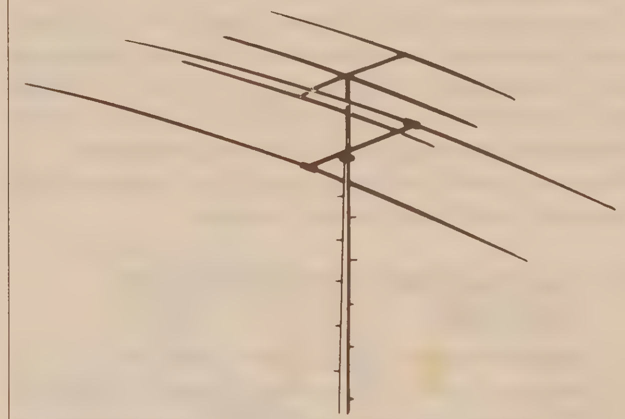


Fig. 5-11 Rotary Beam Antenna

For HF fixed-station operation, an antenna specifically designed for amateur operation is recommended. Antenna types include wire antennas, verticals, rotary beams, and other antenna types. HF antennas are quite large and must be installed to withstand strong wind, heavy rain, etc.

Any antenna used with the TS-430S should be of 50-ohm impedance and should be connected using an appropriate coaxial cable such as RG-8/U.

Impedance matching is important. Impedance mismatching will result in a high VSWR and power loss, or can cause unwanted harmonic radiation and interference (TVI, BCI).

The impedance match can be checked with an SWR meter. Generally, satisfactory operation is assured when the VSWR (Voltage Standing Wave Ratio) is less than 1.5: 1.

A rotary beam antenna is very effective for DX operation in the 14, 21 and 28 MHz bands. (Fig. 5-11)

NOTE:

Protect your equipment – use a lightning arrestor.

SECTION 6. ADDITIONAL INFORMATION

6.1 GENERAL INFORMATION

Your TS-430S has been factory aligned and tested to specification before shipment. Under normal circumstances, the transceiver will operate in accordance with these operating instructions.

If your transceiver fails to work, contact the authorized dealer from whom you purchased it for quick, reliable repair. All adjustable trimmers and coils in your transceiver were preset at the factory and should only be readjusted by a qualified technician with proper thest equipment.

Attempting service or alignment without factory authorization can void the transceiver's warranty.

6.2 INSTALLING THE OPTIONAL FILTERS

1. Remove the power connector from the radio.
2. Using a #2 philips screwdriver, remove the top cover (8 screws). Be careful of the VOX controls, and the speaker lead, which may be unplugged.
3. Loosen the two side screws and remove the 2 screws securing the IF unit bracket. Swing the bracket up slightly to access and remove the two heat sink screws. Swing the assembly down.
4. Remove 7 screws from the IF unit. Switch the board forward. Protect the top of the front panel from scratching.
5. Using a 45W (or less) soldering pencil, clear the 6 holes for the filter, if they are filled with solder. When installing an AM filter, first remove R16 on the IF unit, and cut the R-129 lead on the Control unit.
6. There is no polarity to the filter. Install the filter into its position on the IF unit. Solder the 2 mounting tabs, and the 4 input and output pins to the circuit board. Solder sparingly, and heat the connections only long enough to insure a good solder joint. Don't overheat the filter or circuit board.
7. Carefully inspect your soldering. Be certain that all pins are actually soldered, and that you have not soldered across any spots on the board or between any of the pins on the filter. Clip the pins flush to the board.
8. Replace the IF unit in its place. Make certain no wires will be pinched underneath the board. Replace the 7 screws for the board, plus the two heat sink screws. Tighten the 2 side screws and replace the 2 rear bracket screws, (See that the wire harness does not interfere with the PG scan speed control).
9. Move the connection as illustrated when an AM filter is installed.
10. Reconnect the speaker lead, and reinstall the top cover.
11. Apply power and verify your work. Filter installation is now complete.

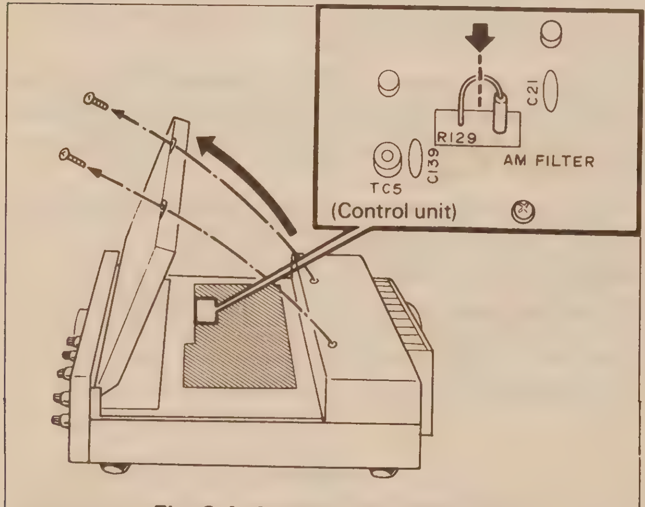


Fig. 6-1 AM filter detail No. 1

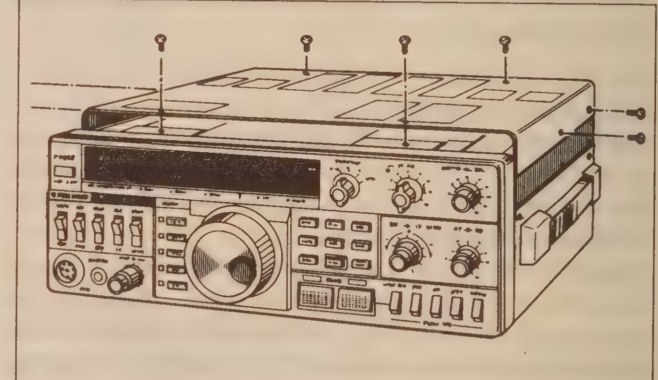


Fig. 6-2 Top cover removal

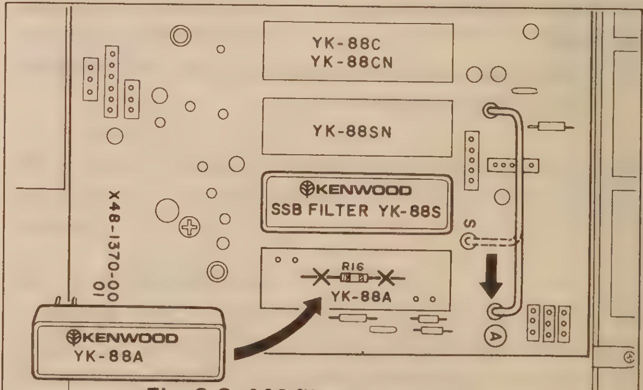


Fig. 6-3 AM filter Detail No. 2

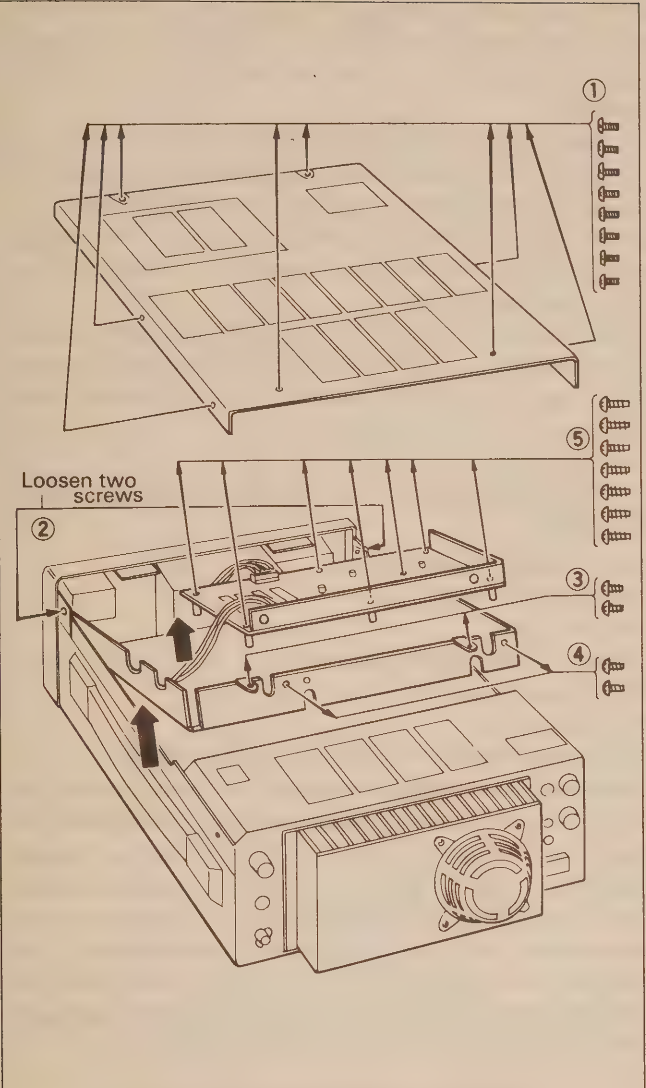


Fig. 6-4 Filter disassembly detail

6.3 OPTIONAL FM-430 INSTALLATION

1. Remove the transceiver top covers and unplug the speaker lead.
2. Mount the FM-430 on the top right side of the transceiver with 6 screws.
3. Connect the FM-430 harness to the transceiver as follows:
   - * Connect the leads from connector (1) to connector (19) of the Switch unit (X41-1470-00).
   - * Connect the leads from connector (3) to connector (24) of the IF unit (X48-1370-00).
   - * Arrange the leads from connectors (2) and (4) on the bottom of the transceiver to pass along the side of the Switch unit. Connect the leads from connector (2) to connector (20) of the RF unit (X44-1510-00). Connect the leads from connector (4) to connector (6) of the RF unit.
4. Tie the leads as illustrated using the supplied vinyl ties.
5. Reinstall the bottom cover, reconnect the speaker lead, and reinstall the top cover.

CONNECTION OF FM-430 CONNECTIORS

FM-430 connector No.	Unit and TS-430 connector No.
(1)	Switch unit (X41-1470-00) 19
(2)	RF unit (X44-1510-00) 20
(3)	IF unit (X48-1370-00)...................... 24
(4)	RF unit (X44-1510-00) 6

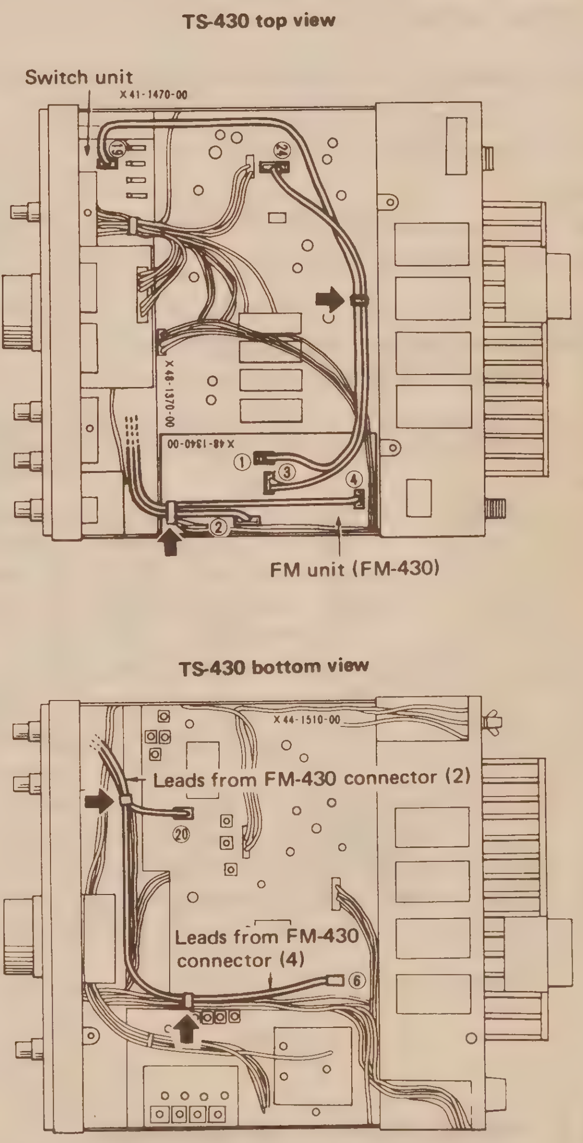


Fig. 6-5 FM-430 Installation

6.4 HOW THE TX FINAL TRANSISTORS ARE PROTECTED

Final transistor protection is provided by sampling the reflected power. As the reflected power is increased (higher SWR) transmitter drive is reduced, thus decreasing input to the final transistors. This in turn reduces collector loss, protecting the final transistors.

6.5 TRANSMITTING ON WARC BANDS

As supplied, the TS-430S will receive but not transmit on the 2 new WARC bands. If transmit capability is desired, a minor wiring change is required.

1. For 2 bands: On the Rf unit X44-1510-00 cut the White jumper.
2. Or for individual Bands: On the RF unit:

Band	Remove (or cut) Part
18 MHz	D66
24.5 MHz	D67

Note:

For units shipped to countries other than the U.S.A., above discussion should be disregarded.

6.6 OPTIONAL 10Hz DISPLAY RESULUTION

If you would like 10Hz instead of the supplied 100 Hz display resolution, cut the jumper as shown on the Control unit.

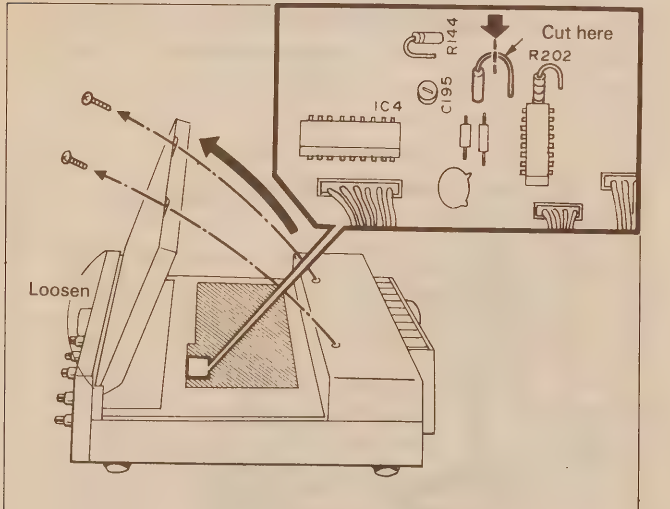


Fig. 6-6

6.7 PHONE PATCH OPERATION

In an area where phone patch is legal,the PC-1A Phone Patch may be used with the TS-430S. Recommended setting are:

PC-1A	RX Gain	4	TS-430S	VOX Gain	1
	TX Gain	4		AF Gain	4
	Null as necessary			Mic Gain	5
				ANTI VOX	Max

Most other phone patches will work satisfactorily without any modification to the radio, requiring only an external speaker connection, and that the Mic line be run through the patch.

For those operators who desire a Patch input similar to the TS-930S, TS-520SE or TS-820S, an input connection and terminal must be added at the Mic input preamp circuit.

Use a 100-KΩ resistor in series, with a 10-kΩ to ground on the input side of the 100-kΩ resistor. Use shielded line, and connect as follows:

On the IF unit X48-1370-00 install the fixed divider at the junction of R161 10k, C94 100pf, and C93 1μF (input of Q34). Add an RCA jack at the empty rear panel opening or use remote pins 7 and Gnd for input.

6.8 OPERATION WITH A LINEAR AMPLIFIER.

Operation with a linear amplifier.

TS--430S internal wiring.

Pin 6 ALC input

Connector Metal Shell is Ground

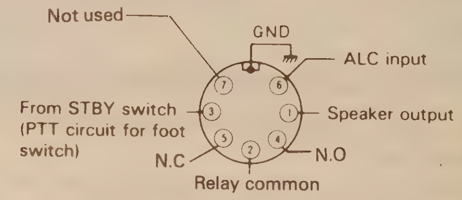
Pin 2, Relay Common

Pin 4, Relay N.O.

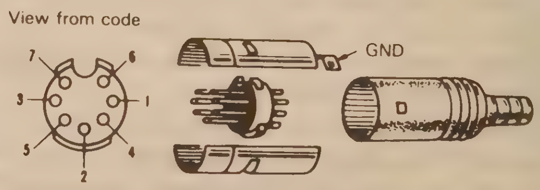
Use shielded line for both ALC and RL (control line).

Initial linear amplifier tune-up should be perfomed with the exciter at 50% power, to reduce wear-and-tear on both the linear, and the exciter. Use of a dummy load is strongly suggested, since the bands are already sufficiently crowd.

The TS-430S may be operated with any conventional linear amplifier which will accept up to approximately 100 watts RF drive, has a low currrent DC operated keying circuit, and returns approximately –8 ~ –10 V DC ALC (adjustable) back to the exciter.



TS-430 Internal Wiring



REMOTE connector

Fig. 6-7 REMOTE connector

PIN	FUNCTION	PIN	FUNCTION
1	Speaker output	5	Relay N.C
2	Relay common	6	ALC input ALC threshold level approx. −6V
3	PTT line	7	Not used
4	Relay N.O		

6.9 ACC Connector Data

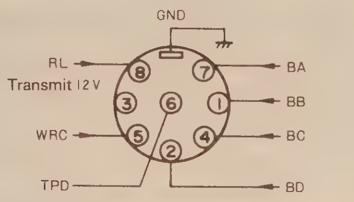
ACC connector output

PIN No. / Freq. band [MHz]	No. 2 BD	No. 4 BC	No. 1 BB	No. 7 BA
0.15 ~ 0.4999	0	0	0	0
0.5 ~ 1.5999	0	0	0	1
1.6 ~ 2.4999	0	0	1	0
2.5 ~ 3.9999	0	0	1	1
4.0 ~ 6.4999	0	1	0	0
6.5 ~ 7.4999	0	1	0	1
7.5 ~ 10.4999	0	1	1	0
10.5 ~ 15.9999	0	1	1	1
16.0 ~ 22.9999	1	0	0	0
23.0 ~ 29.9999	1	0	0	1

Note: Band output data is TTL level.
0 = Low
1 = high

Frequency band [MHz]	Pin No. 5 WRC
0.15 ~ 1.5999	1
1.6 ~ 1.9999	0
2.0 ~ 2.9999	1
3.0 ~ 3.9999	0
4.0 ~ 6.8999	1
6.9 ~ 7.4999	0
7.5 ~ 13.8999	1
13.9 ~ 14.9999	0
15.0 ~ 20.8999	1
20.9 ~ 21.9999	0
22.0 ~ 27.8999	1
27.9 ~ 29.9999	0

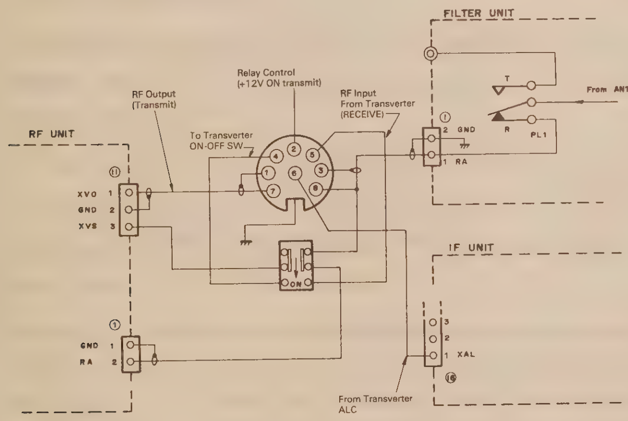
ACC connector wiring



Note: Grounding this terminal reduces transmit output to approx. 50W.

Fig. 6-8

6.10 CHART AND CONNECTION FOR X. VERTER



X VTR Connector

6.11 SSTV or AFSK operation

The TS-430S will adapt to slow scan television or AFSK RTTY operation. For SSTV, the only cabling required are connections between the transceiver microphone input and the camera output, and between the speaker output and the monitor input.
When transmitting, adjust the transmitter output so that final input power is less than approximately 100 W, or for approximately 1/2 of normal output power. For AFSK operation, connect the T.U. output to the microphone input, and speaker output to the T.U. inpunt.

6.12 FRONT BAIL

The transceiver can be elevated for operating convenience by extending the bail.

6.13 OPERATION WITH A SECOND RECEIVER

Use the XVRTR port and an 8 Pin DIN Plug, Part E07-0851-05.

Pin 8	HF Ant output from the TS-430S
Pin 5	RX Ant input
Pin 3	GND
Pin 2	RL control, 12V DC in TX

Connect pins 8 and 5 together and through a short length of 50Ω coax to your second receiver Ant input.
Use pin 2 to mute the second receiver in TX.

6.14 OPERATION WITH A SEPARATE RECEIVER ANTENNA.

Use the XVRTR port and an 8 Pin DIN Plug, Part E07-0851-05

Pin 8	HF Ant output from the TS-430S
Pin 5	RX Ant input
Pin 3	GND

Either wire your extra antenna to pin 5 and ground, and use the DIN plug as the connect/disconnect, or wire pins 8 and 5 and the external antenna through a SPDT switch.

6-15 OPERATION AS A SECOND RECEIVER

Use the REMOTE Connector. Connect Pin 3 (PTT line) (and Pin 2, GROUND) to your XMTR control output, to ground Pin 3 in TX. Feed the antenna through the primary transmitter or transceiver antenna relay.

6.16 ADJUSTMENTS

1. S Meter Zero is VR2 on the IF unit.
2. S meter S-9 calibration is VR3 on the IF, set with 50μV input at 14.175 MHz.
3. "Beeper" audio level is VR6 on the IF unit.
4. CW Sidetone level is VR10 on the IF unit.
5. VFO dial drag (torque) is adjustable from the small slotted screw accessed through the bottom cover, directly under the VFO.

SECTION 7. TROUBLE SHOOTING

The problems described in this table are failures caused in general by improper operation or connection of the transceiver, not by defective components.

There is a separate Service Manual for repair of the Transceiver.

TRANSMITTER AND RECEIVER CIRCUITS

SYMPTOMS	CAUSE	REMEDY
Pilot lights do not light and there is no receiver noise when the POWER switch is turned on.	1. Power cord disconnected or AC power OFF. 2. Loose power connector. 3. Blown fuse. 4. PS-430 POWER switch OFF.	1. Connect power cord. Turn AC power ON. 2. Reconnect. 3. Replace fuse (If fuse blows again, contact service station.) 4. Turn ON the PS-430 power switch.
RECEIVER SECTION		
No signals received with antenna connected.	Standby or microphone PTT switch is in transmit position.	Place switch in receive position.
S-meter deflects without signals.	1. Power supply voltage is too low. 2. RF gain is too low.	1. Adjust voltage to 13.8V DC (12 ~ 16V DC). Reset voltage selector to correct local AC line voltage (PS-430). 2. Turn RF GAIN control fully clockwise.
SSB signal unintelligible.	Wrong sideband.	Set MODE switch to alternate SSB position.
.SSB received signal is high or low cut.	IF SHIFT is out of adjustment.	Set to the center position (click).
Frequency remains the same when RIT control is adjusted	RIT switch is OFF.	Depress RIT switch ON.
No output.	Standby switch not in transmit position. CAR or MIC control in minimum position.	Turn CAR or MIC clockwise.
No SSB output.	1. MIC plug loose. 2. MIC control in minimum position.	1. Reconnect. 2. Turn MIC control clockwise.
FMing in sideband operation.	Unstable or insufficient Power Supply.	Adjust voltage to 13.8V DC (12 ~ 16V DC). Reset voltage selector ro correct local AC line voltage (PS-430).
VOX circuit inoperative	1. VOX control in minimum position. 2. VOX switch in MAN position.	1. Turn VOX control clockwise. 2. Set VOX switch to VOX.
VOX operates by sound from speaker.	ANTI VOX setting incorrect.	Turn ANTI VOX control clockwise.
VOX circuit releases between words or holds too long.	VOX time hold control requires adjustment.	Adjust delay control.
Signal reports of distortion	Too much microphone gain.	Reduce MIC control.
Mic or radio chassis is "hot" during TX.	Excess RF in the shack. No earth ground, poor ground, or antenna is too close to the radio.	1. ANT too close to X CVR. 2. Poor mic GND. 3. Poor or excess length GND less.
Poor audio in SSB	TX-feedbackExcess RF in the shack.	

SECTION 8. OPTIONAL ACCESSORIES

The following optional accessories are available for use with the TS-430S.

■ **SP-430 EXTERNAL SPEAKER**

The SP-430 is an external speaker designed exclusively for use with the TS-430S. It matches the transceiver in design and tone quality.

■ **SP-40:** MOBILE SPEAKER

■ **PS-430 REGULATED DC POWER SUPPLY**

The PS-430 is a regulated DC power supply with high current capability. The output is 13.8 VDC/20A (intermittent). Since terminals for 13.8 VDC/10A are also provided, in addition to an output power cable for use with the TS-430S, the PS-430 can also be used as the power source for another low power mobile transceiver such as a 2-meter rig.

■ **FM-430:** FM UNIT

■ **HF LINEAR AMPLIFIER TL-922/TL-922A**

The TL-922/TL-922A is an HF linear amplifier operating at maximum legal power, and employing a pair of 3-500Z high performance transmitting tubes. The TL-922A (without 10m band) is available only in U.S.A.

■ **HS-4:** HEADPHONES

■ **HS-5 COMMUNICATIONS HEADPHONES**

Headphones designed for communications equipment. These light-weight open air-type headphones remain comfortable during extended operation. Easily attached earpads are provided.

■ **HS-6 COMMUNICATIONS HEADPHONES**

Deluxe, very lightweight headphones designed for communications equipment.

■ **HS-7:** COMMUNICATIONS HEADPHONES

■ **MC-60A BASE STATION MICROPHONE**

Communications microphone with push-to-talk and remote frequency UP/DOWN switches.

■ **HC-10: DIGITAL WORLD CLOCK**

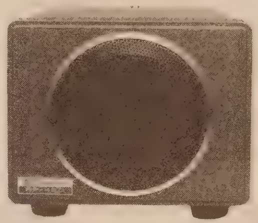
The HC-10 is a highly advanced world clock with dual displays which can memorize 10 preset world major cities and 2 additional programmable regions.

■ **MB-430 MOBILE MOUNT**

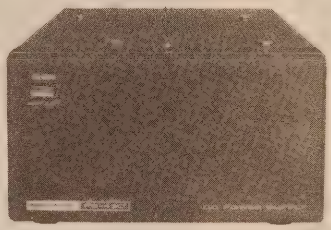
Mobile mount designed for the TS-430S. It allows easy installation and removal the transceiver.
The MB-430 can either be suspended from the dashboard or attached to the transmission tunnel or a center console. The transceiver tilt angle can be adjusted 5 steps.

■ **MC-42S:** MICROPHONE (8 pin plug)

SP-430



PS-430

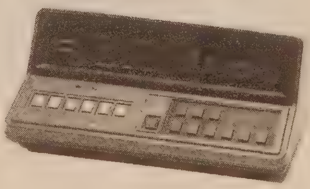


HS-5

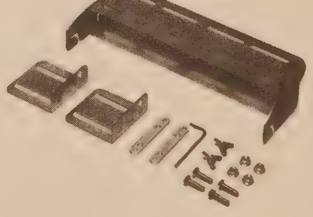
HS-6

MC-60A

HC-10



MB-430



Filter Options

For AM

■ YK-88A

Center Frequency : 8,831.5 kHz
Passband Width : 6 kHz (–6 dB)
Attenuation Bandwidth : 11 kHz (–60 dB)
Guaranteed Attenuation : More than 80 dB

YK-88A

For CW

■ * YK-88C

Center Frequency : 8,830.7 kHz
Passband Width : 500 kHz (–6 dB)
Attenuation Bandwidth : 1.5 kHz (–60 dB)
Guaranteed Attenuation : More than 80 dB

YK-88C

For CW

■ YK-88CN

Center Frequency : 8,830.7 kHz
Passband Width : 270 kHz (–6 dB)
Attenuation Bandwidth : 1.1 kHz (–60dB)
Guaranteed Attenuation : More than 80 dB

YK-88CN

For SSB

■ YK-88SN

Center Frequency : 8,830.0 kHz
Passband Width : 1.8 kHz (–6 dB)
Attenuation Bandwidth : 3.3 kHz (–60 dB)
Guaranteed Attenuation : More than 80 dB

YK-88SN

■ Model AT-130 Antenna Tuner

The AT-130 is a compact antenna tuner designed for use with the TS-430S in either a mobile or fixed station. The SWR meter is illuminated. It is equipped with a highly accurate SWR detecting circuit for matching within the impedance range between 20 and 300 ohms on all amateur bands between 3.5 and 29.7 MHz.

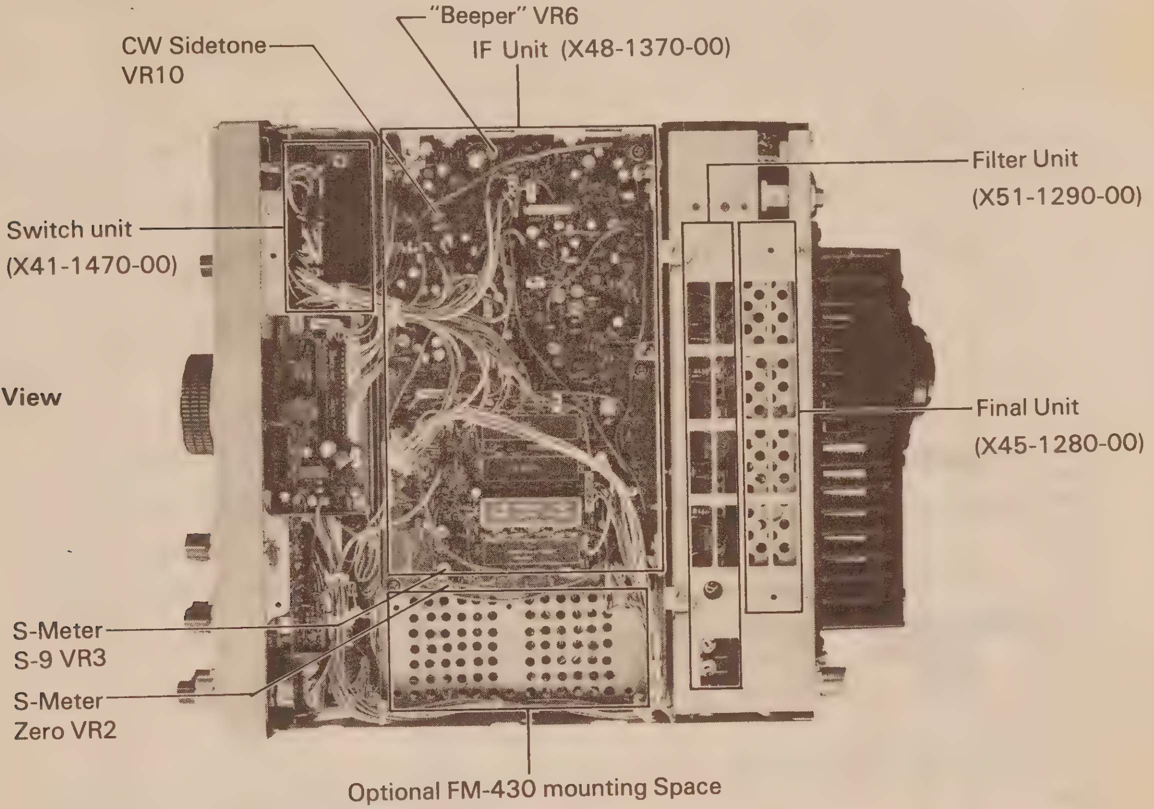
AT-130

■ PC-1A: PHONE PATCH

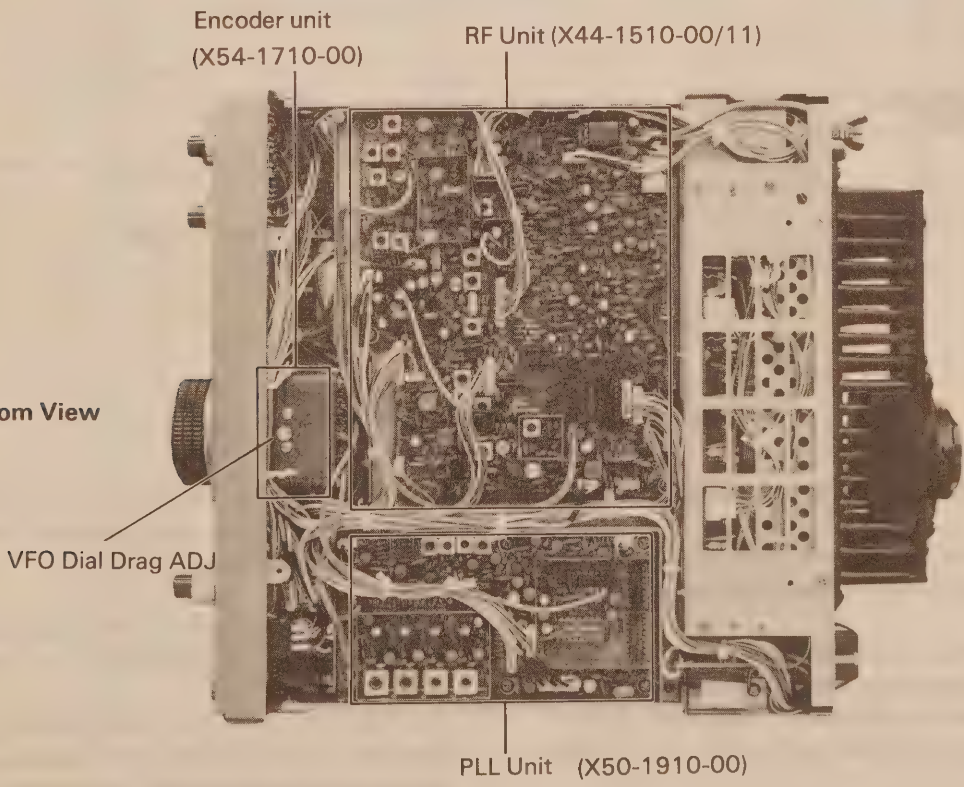
(Available only where phone patch operation is legal.)
Hybrid phone patch with VU meter for null and audio gain measurements.
The PC-1A Phone Patch provides interface between the transceiver and telephone line.
Providing excellent performance, it is designed with high isolation between receive input and transmit output.
Its compact design permits easy installation in a limited space.
(FCC Part 68 registered)

SECTION 9 INTERNAL VIEWS

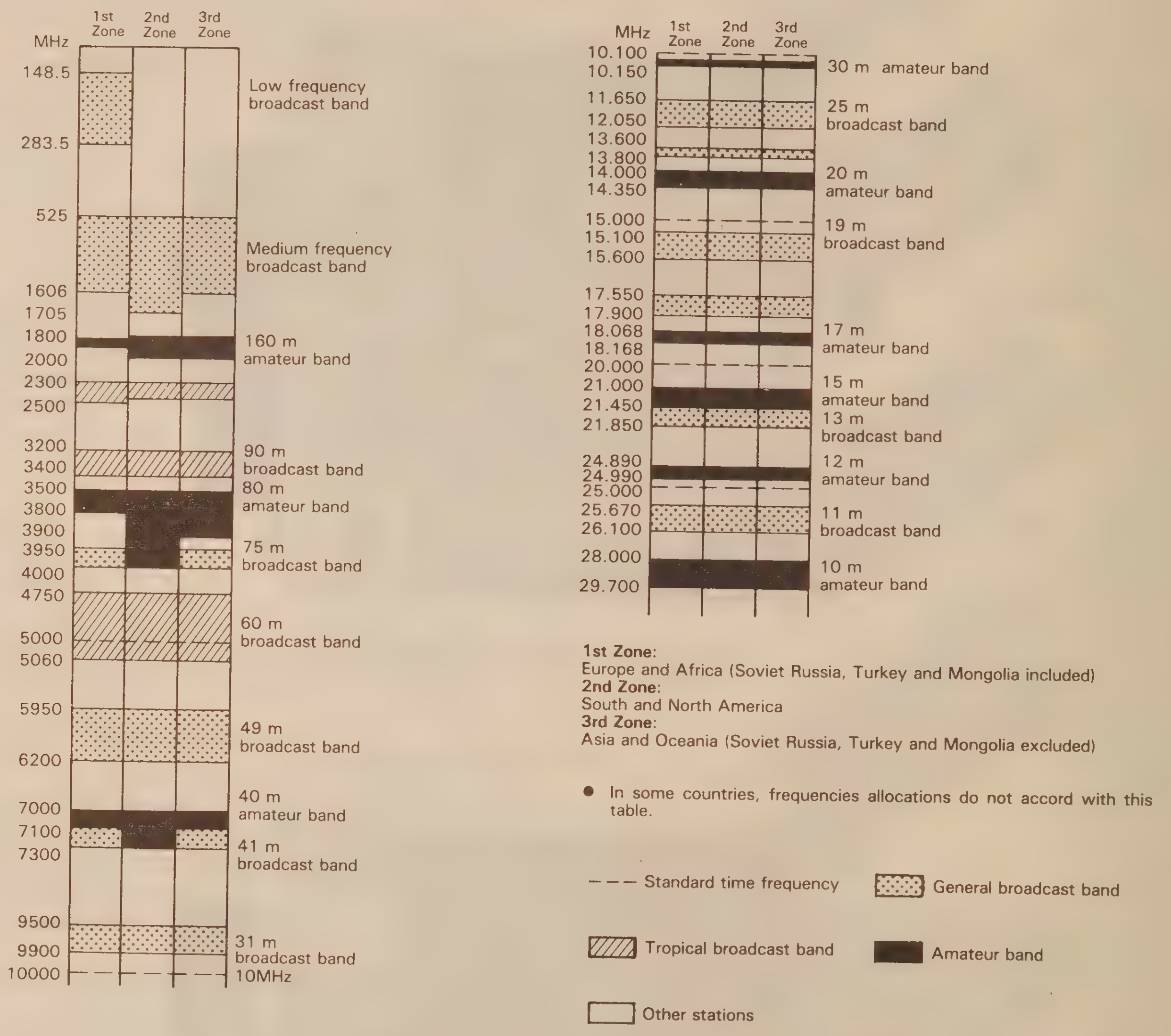
Top View



Bottom View



Section 10 RADIO FREQUENCY ALLOCATION



1st Zone:
Europe and Africa (Soviet Russia, Turkey and Mongolia included)
2nd Zone:
South and North America
3rd Zone:
Asia and Oceania (Soviet Russia, Turkey and Mongolia excluded)

- In some countries, frequencies allocations do not accord with this table.

Fig. 10-1 Radio frequency allocation

Frequency Distribution in the Broadcast and Amateur Bands.

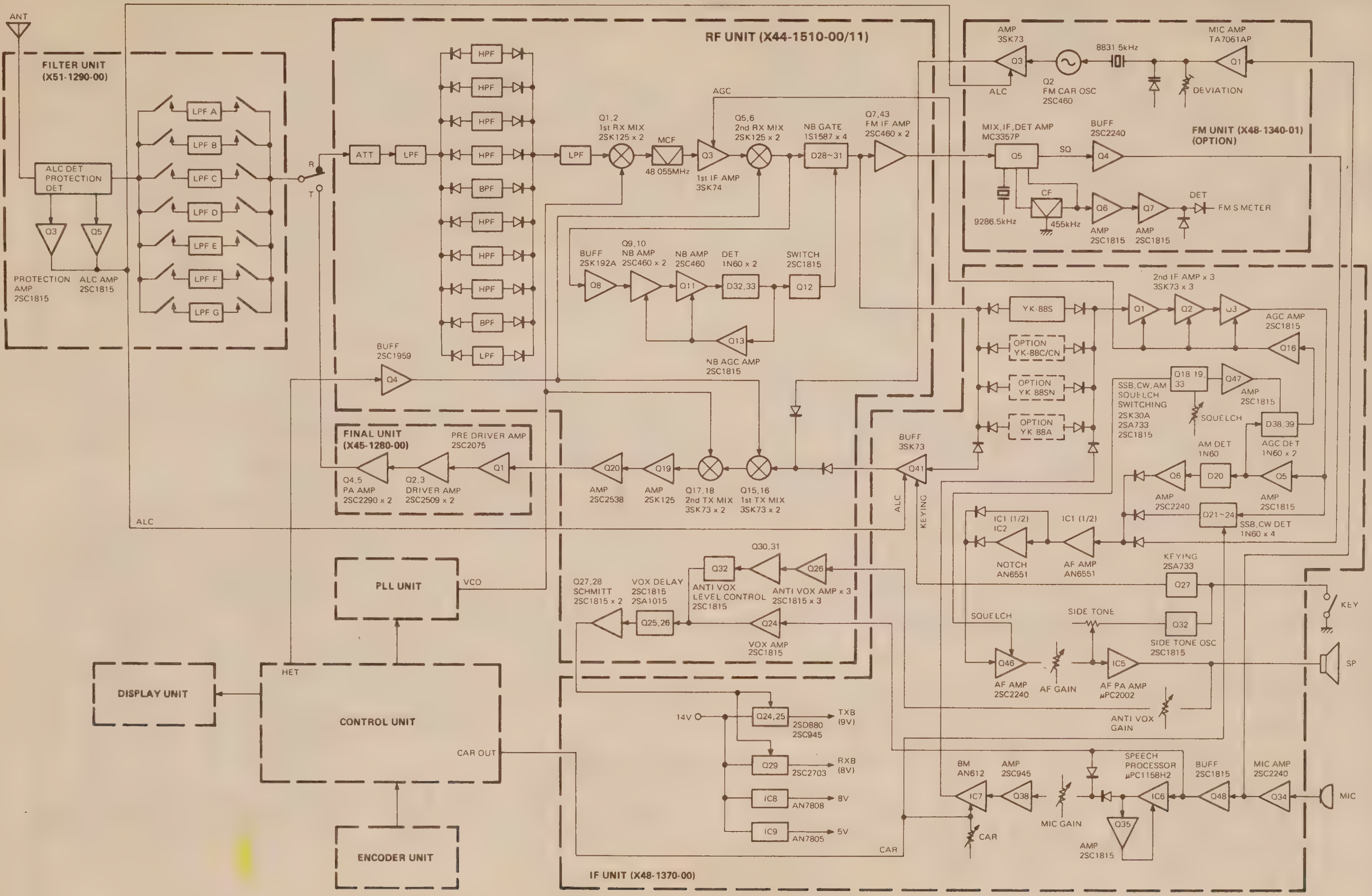
The TS-430S receiver covers from 150 kHz to 30 MHz, to receive international broadcast and communication services.

As shown in the Frequency Allocation Chart, Fig. 10-1, broadcast and Amateur radio station frequencies are allocated in specific bands expressed in megahertz (MHz) or wavelength in meters (m). Also in Fig. 10-1, the frequencies of "other stations" are assigned for fixed station business use, marine mobile, aviation mobile, land mobile, radio beacon stations, etc.

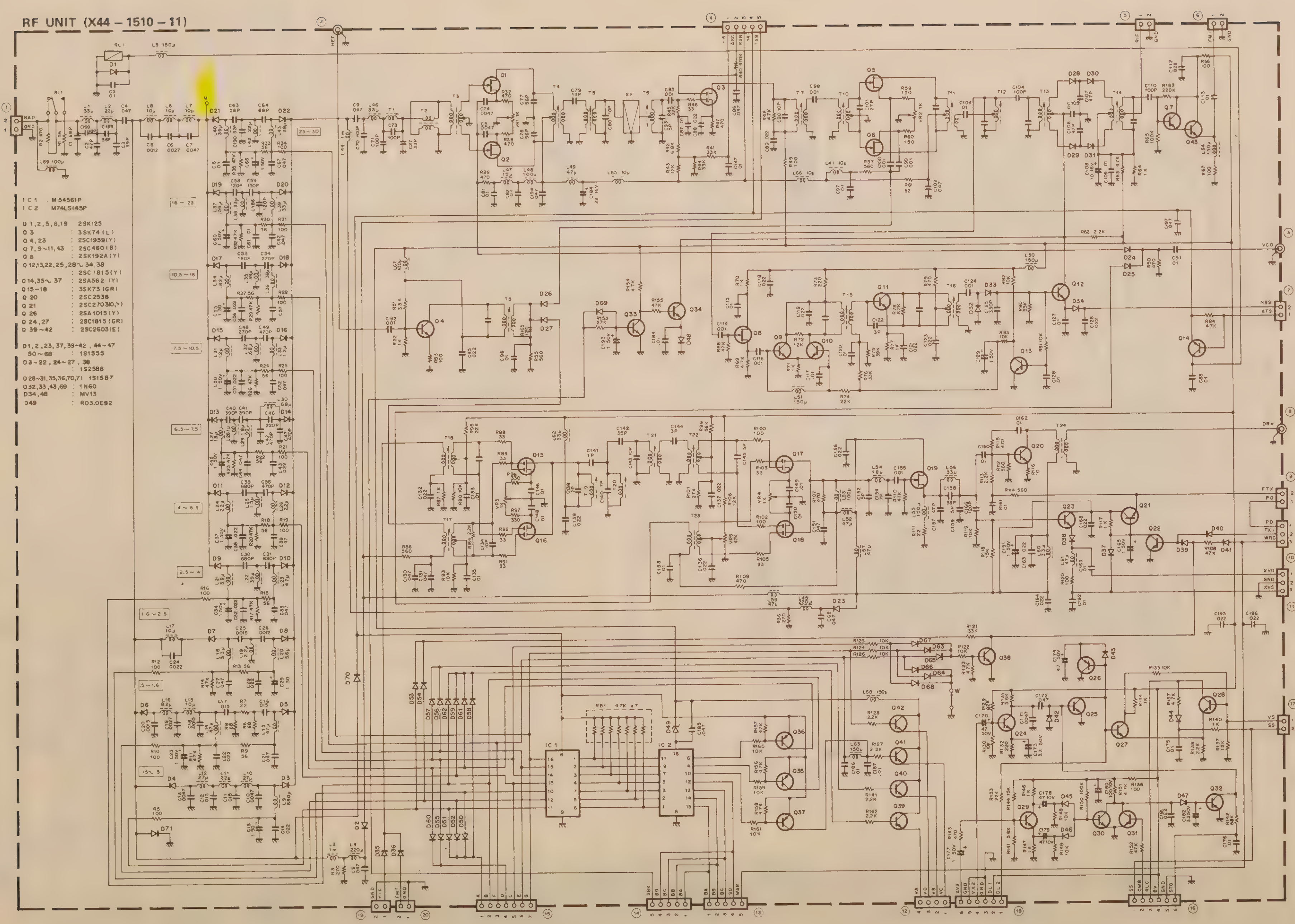
NOTE:

1. Radio stations throughout the world are listed in the WORLD RADIO TV HANDBOOK or similar publications.
2. Antennas designed for HAM BAND operation will generally provide satisfactory reception for SW stations near the HAM BANDS. For antenna construction details, see the ARRL ANTENNA HANDBOOK, or similar publications.

BLOCK DIAGRAM

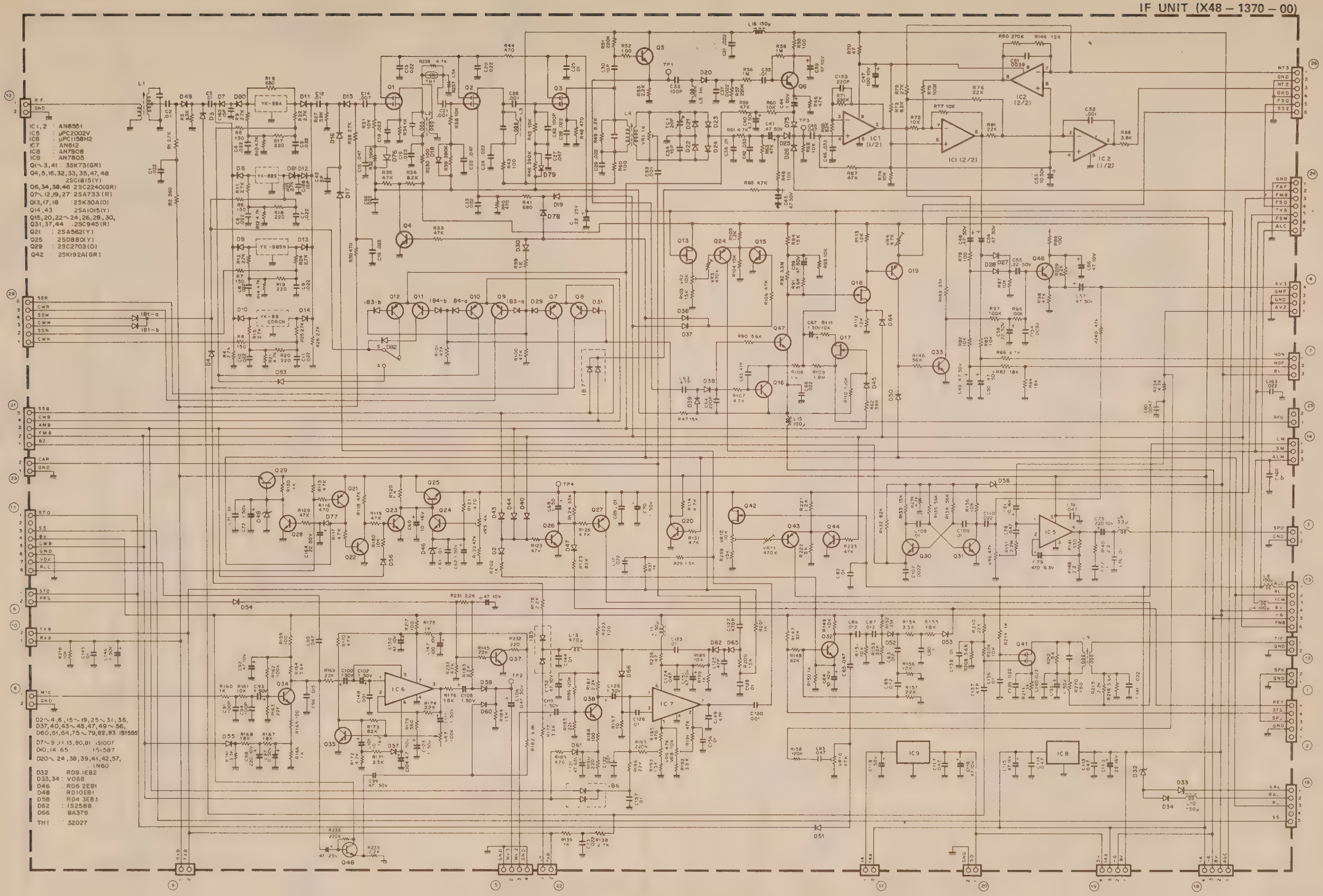


TS-430S RF UNIT (X44-1510-00/11)



IC 1	. M54561P
IC 2	M74LS145P
Q 1,2,5,6,19	2SK125
Q 3	: 3SK74 (L)
Q 4,23	: 2SC1959 (Y)
Q 7,9~11,43	: 2SC460 (B)
Q 8	: 2SK192A (Y)
Q 12,13,22,25,28~34,38	: 2SC1815 (Y)
Q 14,35~37	: 2SA562 (Y)
Q 15~18	: 3SK73 (GR)
Q 20	: 2SC2538
Q 21	: 2SC2703(O,Y)
Q 26	: 2SA1015 (Y)
Q 24,27	: 2SC1815 (GR)
Q 39~42	: 2SC2603 (E)
D1,2,23,37,39~42, 44~47 50~68	: 1S1555
D3~22, 24~27, 38	: 1S2588
D28~31,35,36,70,71	1S1587
D32,33,43,69	: 1N60
D34,48	: MV13
D49	: RD3.0E82

TS-430S IF UNIT (X48-1370-00)



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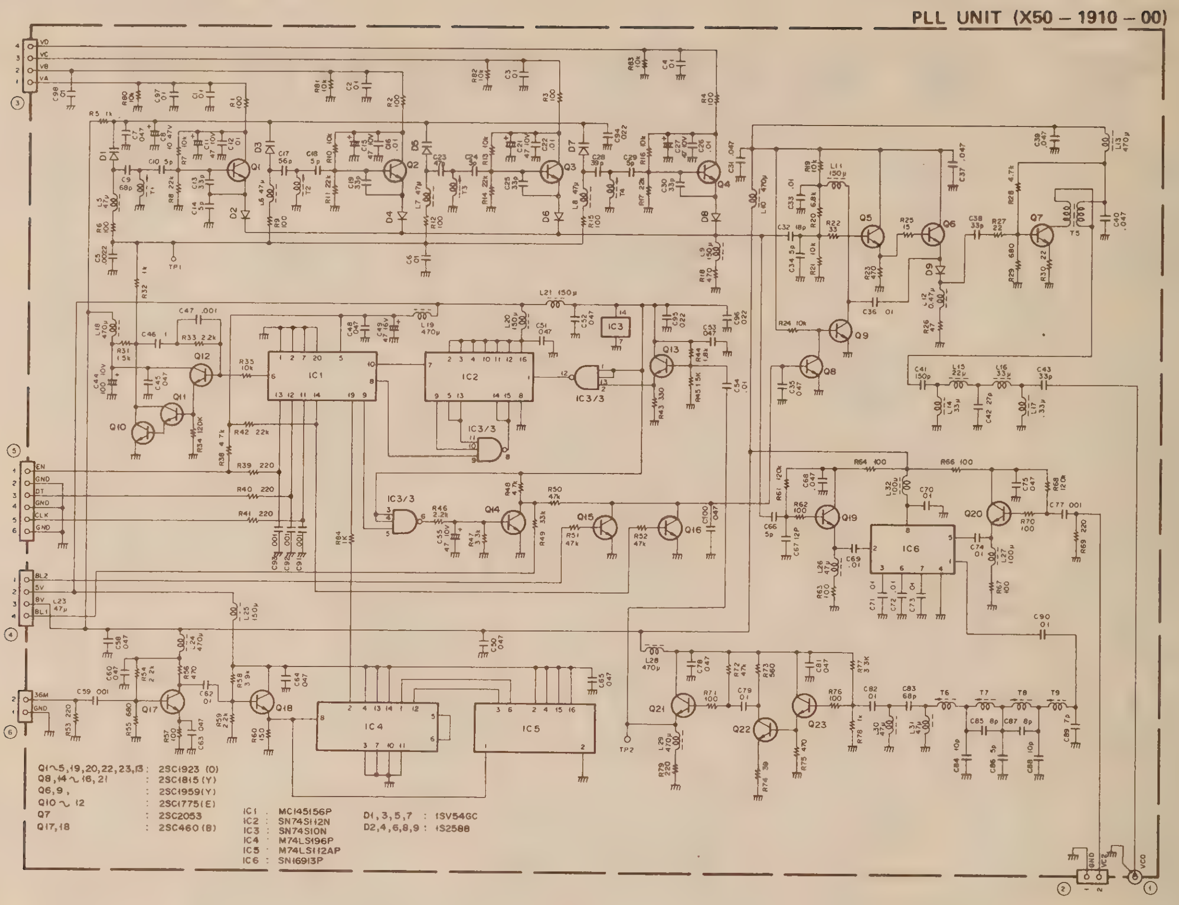
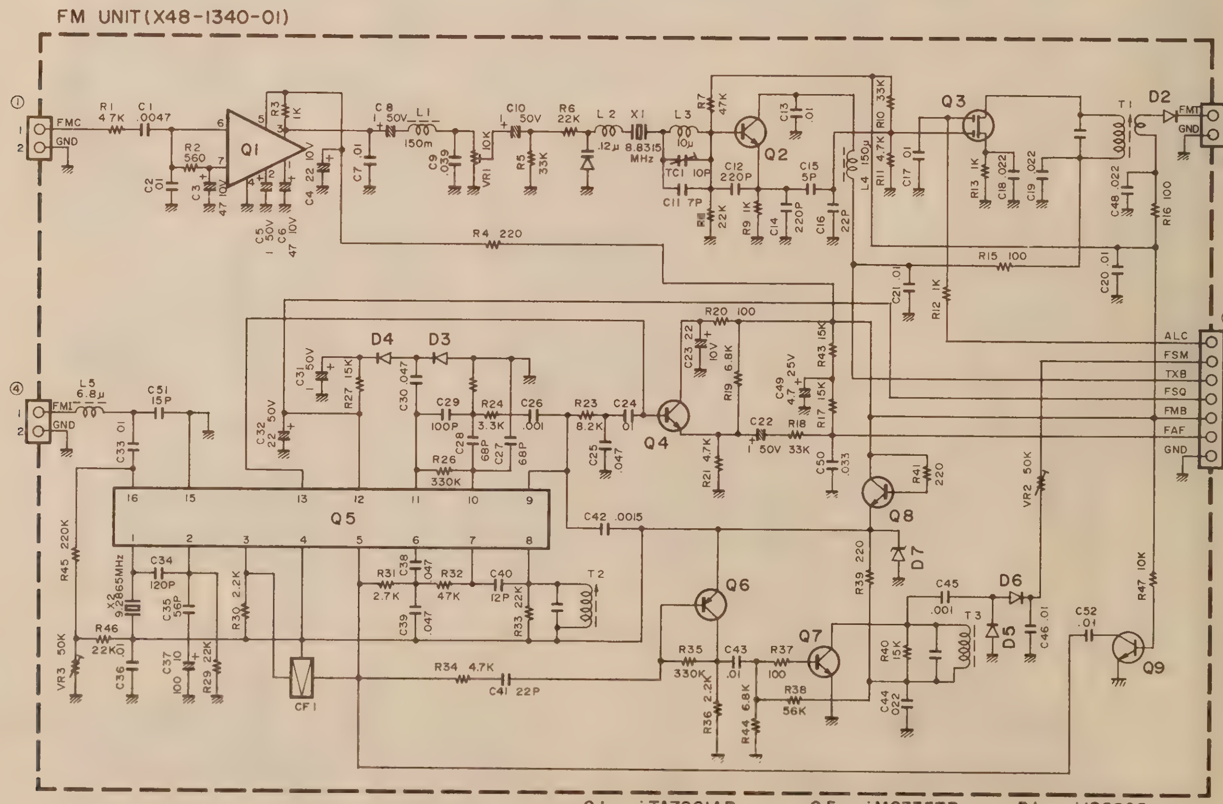
TS-430S PLL UNIT (X50-1910-00)

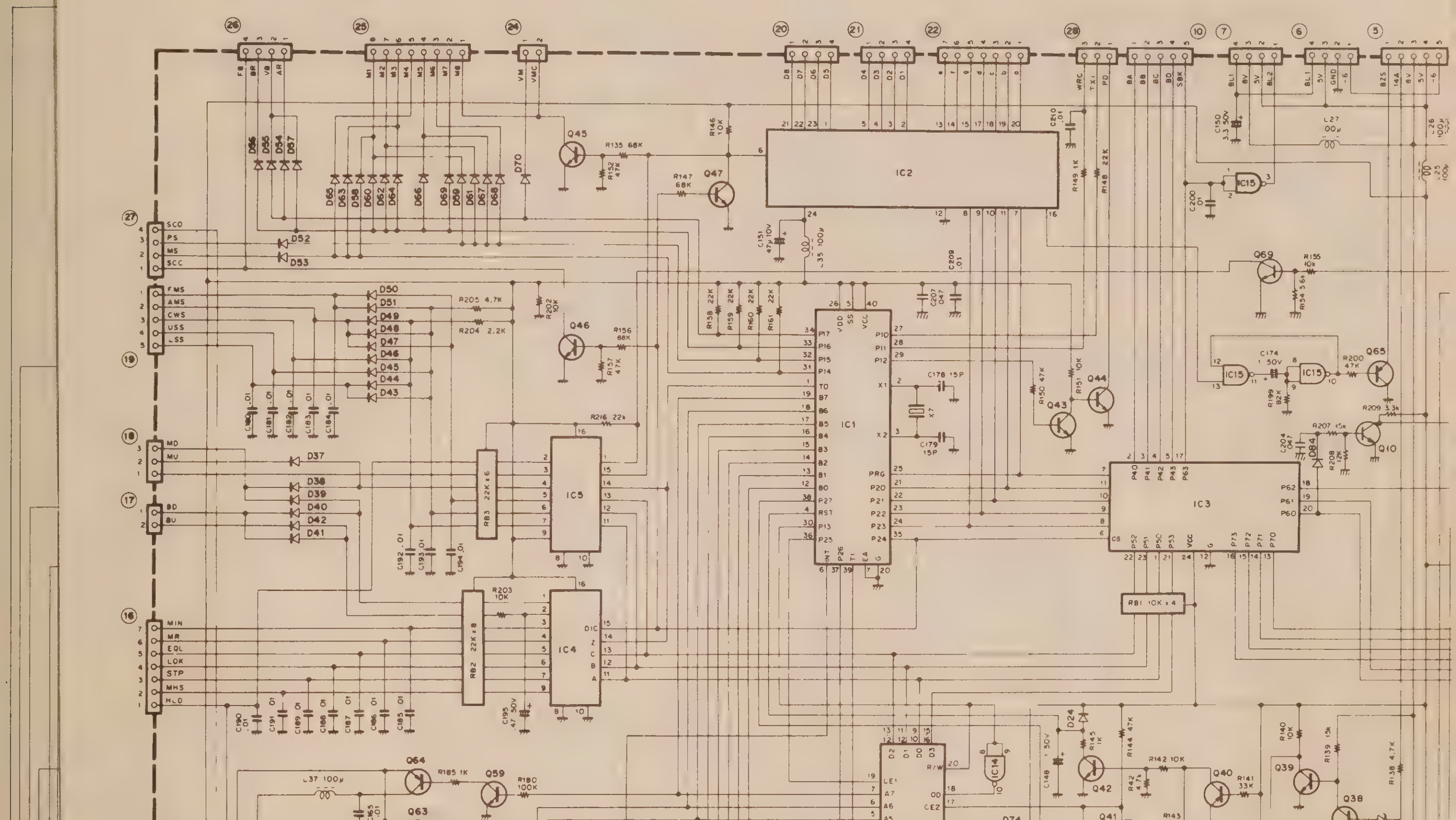


FM-430 (OPTION)

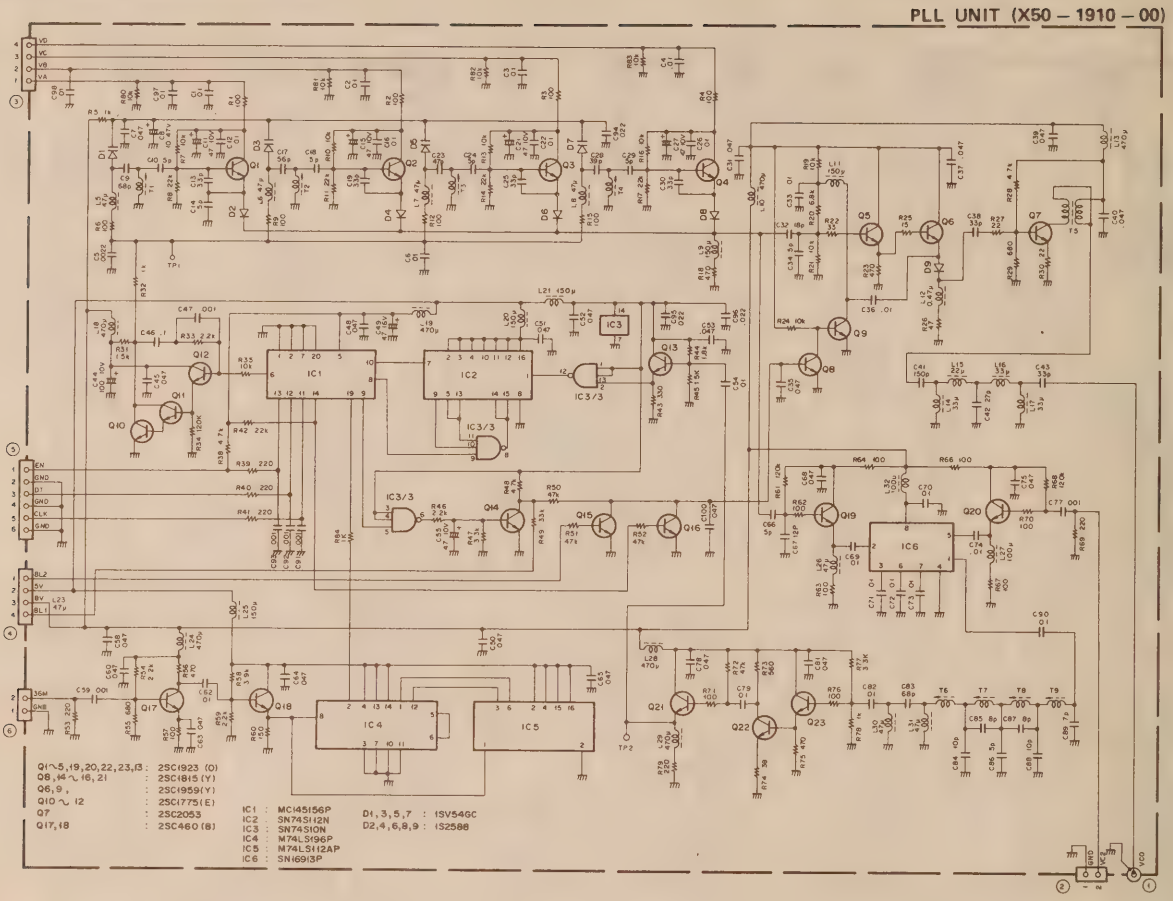


Q1 : TA7061AP
Q2 : 2SC460(B)
Q3 : 3SK73(GR)
Q4 : 2SC2240(GR)
Q5 : MC3357P
Q6 : 2SA1015(Y)
Q7∼9: 2SC1815(Y)
D1 : 1S2208
D2 : 1S1555
D3∼6: 1N60
D7 : WZ071

TS-430S SCHEMATIC DIAGRAM



TS-430S PLL UNIT (X50-1910-00)

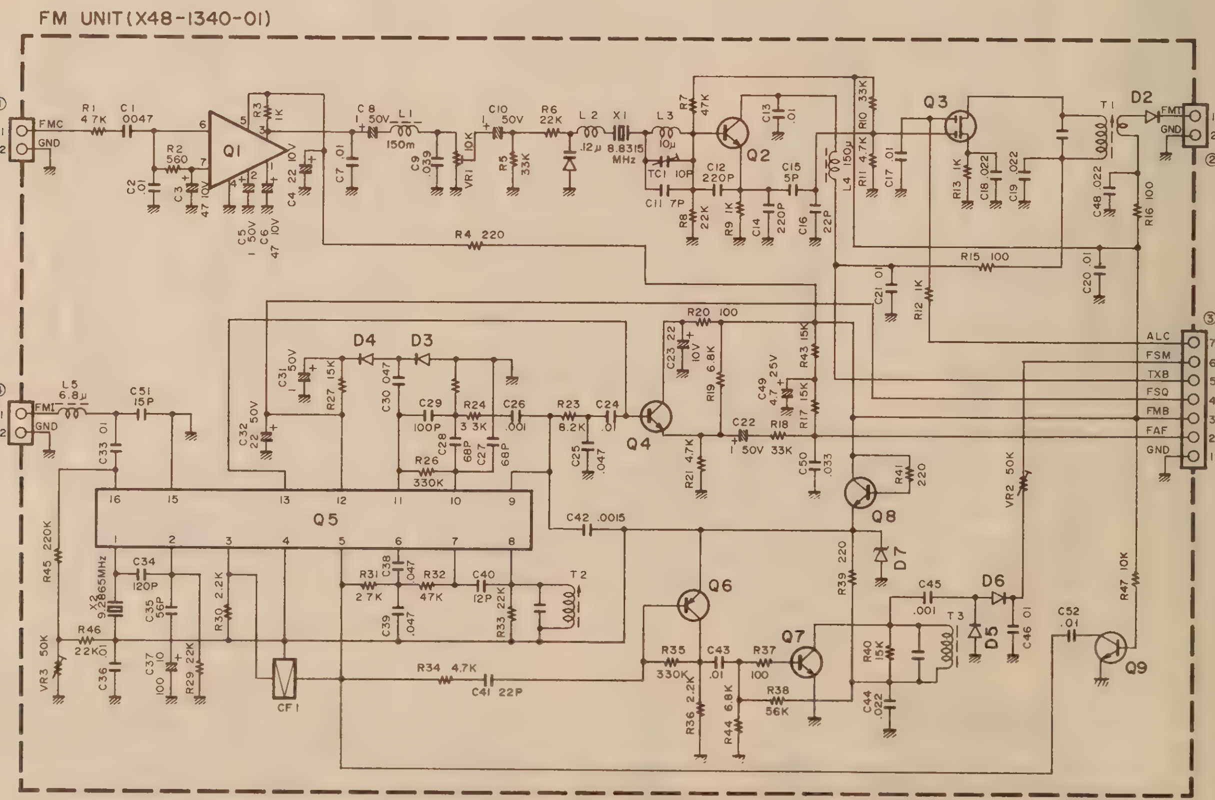


Q1～5,19,20,22,23,13 : 2SC1923 (O)
Q8,14～16,21 : 2SC1815 (Y)
Q6,9, : 2SC1959(Y)
Q10～12 : 2SC1775(E)
Q7 : 2SC2053
Q17,18 : 2SC460 (B)

IC1 : MC145156P
IC2 . SN74S112N
IC3 : SN74S10N
IC4 : M74LS196P
IC5 : M74LS112AP
IC6 : SN16913P

D1,3,5,7 : 1SV54GC
D2,4,6,8,9 : 1S2588

FM-430 (OPTION)

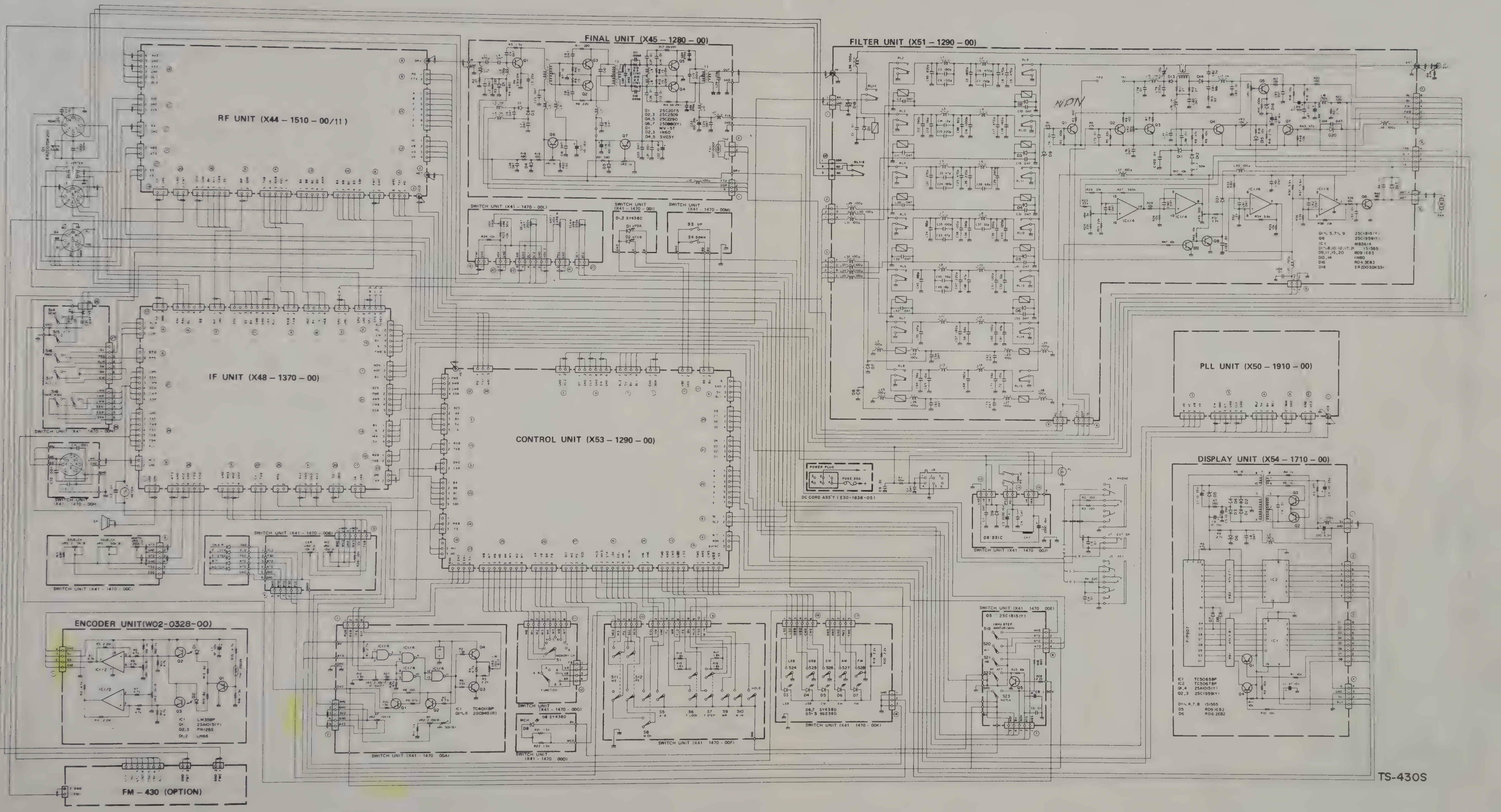


Q1 : TA7061AP
Q2 : 2SC460(B)
Q3 : 3SK73(GR)
Q4 : 2SC2240(GR)

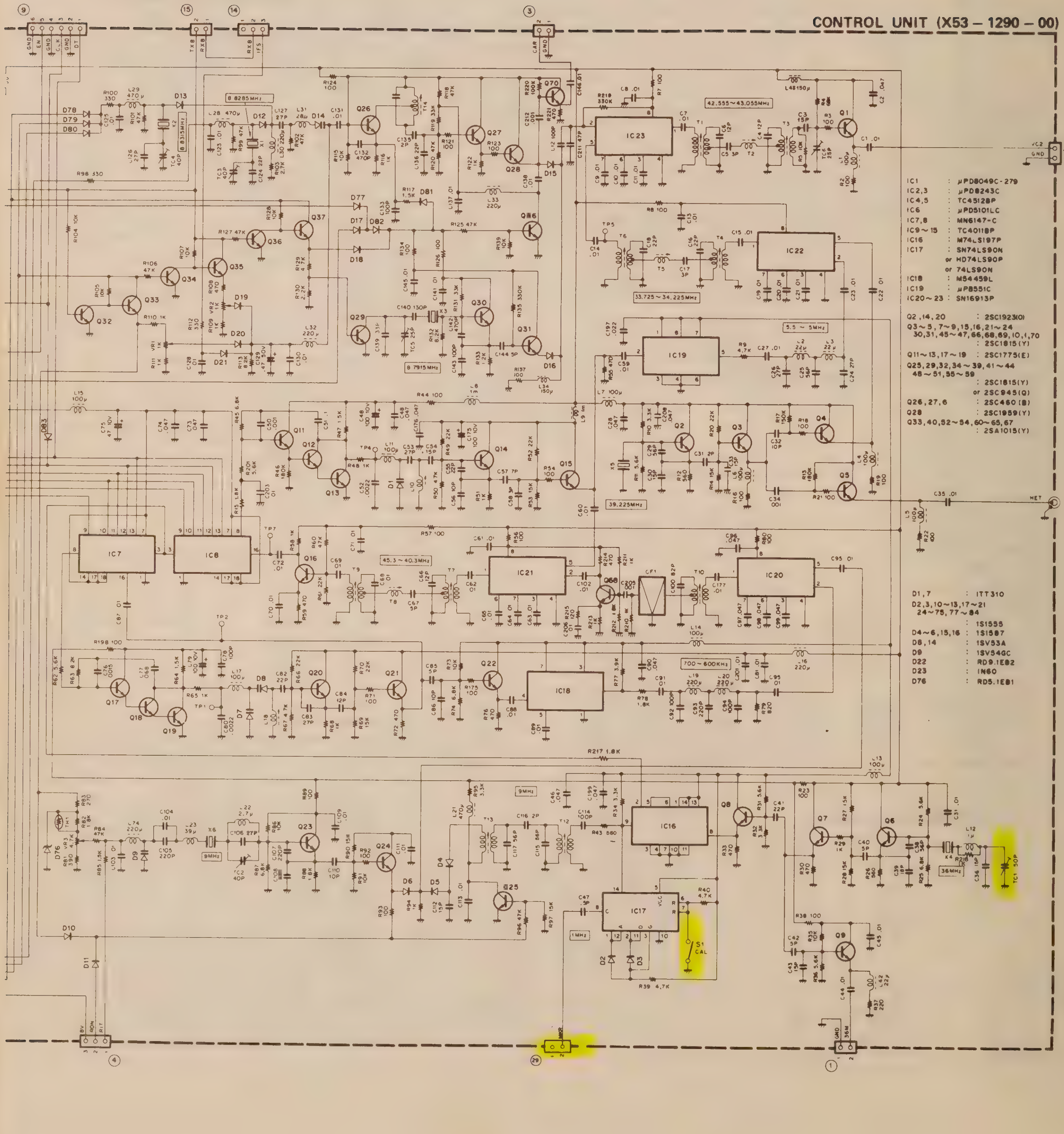
Q5 : MC3357P
Q6 : 2SA1015(Y)
Q7～9: 2SC1815(Y)

D1 : IS2208
D2 : IS1555
D3～6: IN60
D7 : WZ071

TS-430S SCHEMATIC DIAGRAM


FINAL UNIT (X45 – 1280 – 00)
FILTER UNIT (X51 – 1290 – 00)
RF UNIT (X44 – 1510 – 00/11)
IF UNIT (X48 – 1370 – 00)
CONTROL UNIT (X53 – 1290 – 00)
PLL UNIT (X50 – 1910 – 00)
DISPLAY UNIT (X54 – 1710 – 00)
ENCODER UNIT(W02-0328-00)
FM – 430 (OPTION)
SWITCH UNIT (X41 - 1470 - 00L)
SWITCH UNIT (X41 - 1470 - 00J)
SWITCH UNIT (X41 - 1470 - 00M)
SWITCH UNIT (X41 - 1470 - 00H)
SWITCH UNIT (X41 - 1470 - 00C)
SWITCH UNIT (X41 - 1470 - 00B)
SWITCH UNIT (X41 - 1470 - 00A)
SWITCH UNIT (X41 - 1470 - 00G)
SWITCH UNIT (X41 - 1470 - 00D)
SWITCH UNIT (X41 - 1470 - 00F)
SWITCH UNIT (X41 - 1470 - 00K)
SWITCH UNIT (X41 - 1470 - 00E)
SWITCH UNIT (X41 - 1470 - 00J)
DC CORD ASS'Y (E30-1638-05)
POWER PLUG
FUSE 20A
NDN
TS-430S

CONTROL UNIT (X53 – 1290 – 00)



IC1	:	µPD8049C-279
IC2,3	:	µPD8243C
IC4,5	:	TC4512BP
IC6	:	µPD5101LC
IC7,8	:	MN6147-C
IC9 ~ 15	:	TC4011BP
IC16	:	M74LS197P
IC17	:	SN74LS90N or HD74LS90P or 74LS90N
IC18	:	M54459L
IC19	:	µPB551C
IC20 ~ 23	:	SN16913P

Q2, 14, 20	:	2SC1923(O)
Q3 ~ 5, 7 ~ 9, 15, 16, 21 ~ 24 30, 31, 45 ~ 47, 66, 68, 69, 10, 1, 70	:	2SC1815(Y)
Q11 ~ 13, 17 ~ 19	:	2SC1775(E)
Q25, 29, 32, 34 ~ 39, 41 ~ 44 48 ~ 51, 55 ~ 59	:	2SC1815(Y) or 2SC945(Q)
Q26, 27, 6	:	2SC460(B)
Q28	:	2SC1959(Y)
Q33, 40, 52 ~ 54, 60 ~ 65, 67	:	2SA1015(Y)

D1, 7	:	ITT310
D2, 3, 10 ~ 13, 17 ~ 21 24 ~ 75, 77 ~ 84	:	1S1555
D4 ~ 6, 15, 16	:	1S1587
D8, 14	:	1SV53A
D9	:	1SV54GC
D22	:	RD9.1EB2
D23	:	IN60
D76	:	RD5.1EB1

ORDERING SPARE PARTS

Spare parts may be ordered from any TRIO-KENWOOD dealer, or the factory service facility parts department.
When ordering replacement or spare parts for your equipment, be sure to specify the following information:
Model and serial number of the equipment. Schematic number of the part. Printed circuit board number on which the part is located. Part number and name, if known, and Quantity desired.

NOTE:
A full Service Manual is available as a separate publication. TRIO-KENWOOD Service Manuals typically contain: Specifications, expanded circuit descriptions, printed circuit board views, parts list, disassembly, Alignment, level chart, expanded schematics, block diagram, and other reference data.
Schematics show main signal paths, plus DC voltages and votage lines are shown in a second colour. Accessory for the main unit are typically included.

SERVICE

Should it ever become necessary to return the equiment for repair, pack in its original boxes and packing, and include a full description of the problems involved. Also include your telephone number. You need not return accessory items unless directly related to the service problem.

You may return your radio for service to the Authorized Kenwood Dealer from whom you purchased it. A copy of the service report will be returned with the unit. Please do not send sub-assemblies or printed circuit boards. Send the complete unit, in its original boxes and packing. If you want verification of receipt, please supply a self – addressed card (or letter) and you will be informed of the date of receipt and estimated service time.

MASTER OSCILLATOR CALIBRATION

The built-in master oscillator can be calibrated using a WWV signal.

1. Remove the top and bottom cases.
2. Connect the second MKR terminal connector on the Control unit and the RF unit M terminal with the supplied calibration cable.
1. Receive WWV at 10 MHz or 15 MHz (with an antenna connected.)
2. Place the Control CAL switch unit to ON.
3. The WWV signal and the marker signal may make two beat signals (high and low). Adjust the tuning control for zero-beat.
4. Adjust the F.ADJ trimmer TC1 adjacent to the CAL switch for zero-single beat.
   This completes the calibration.
5. Turn the CAL switch OFF, Remove the calibration cable, and replace the cases.

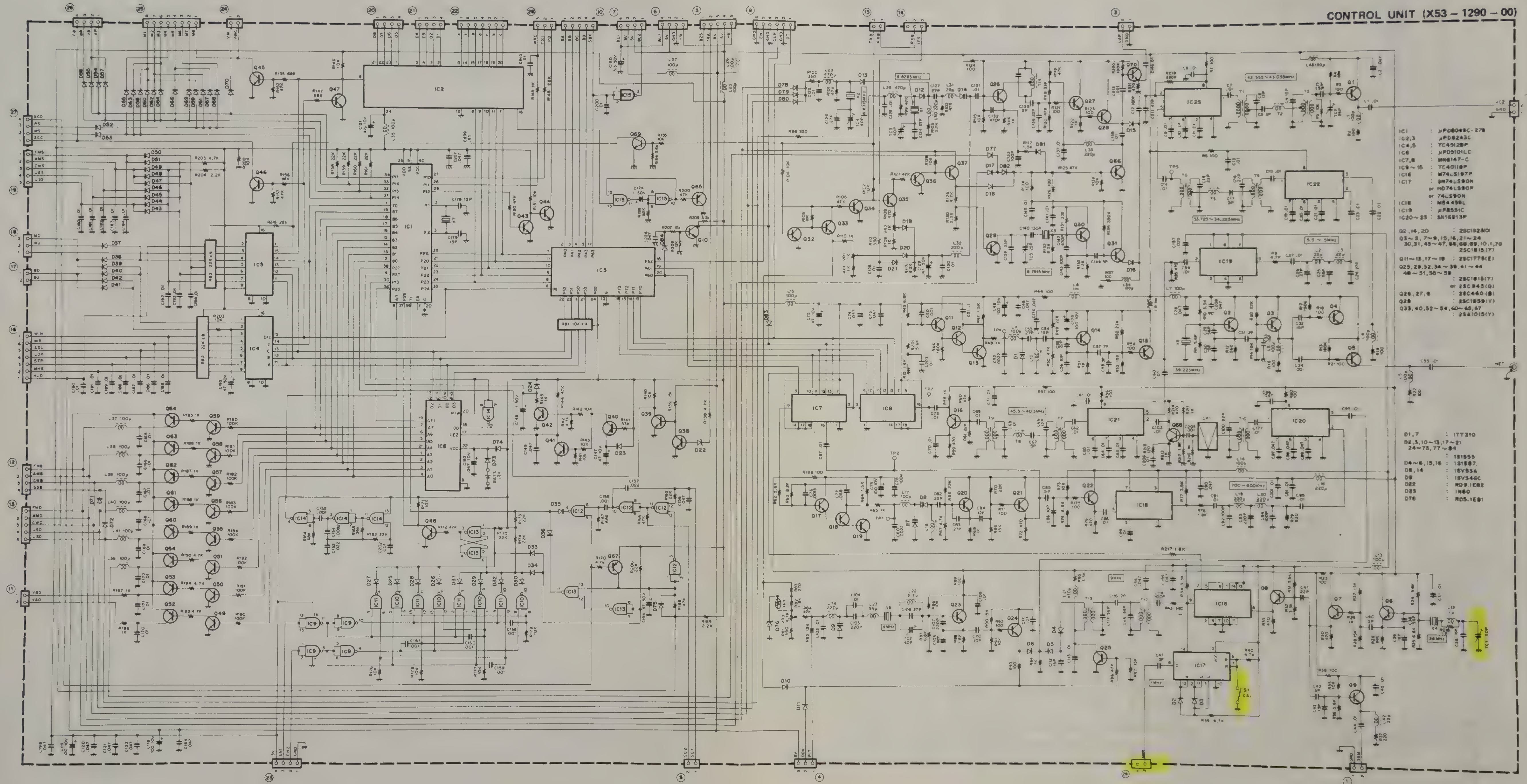
SERVICE NOTE:
Dear OM, if you desire to correspond on a technical or operational problem, please make your note short, complete, and to the point. And PLEASE make it readable.
Please list: Model and serial number.
The question or problem you are having.
Please give sufficient detail to diagnose; other equipment in the station, meter readings and anything you feel might be useful in attempting diagnoses.

NOTE:

1. Record the data of purchase, serial number and dealer from whom purchased.
2. For your own information, retain a written record of any maintenance performed on the unit.
3. When claiming warranty service, please include a photocopy of the bill of sale, or other proof of purchase showing the date of sale.

LITHIUM BATTERY FOR MICROPROCESSOR BACK-UP
The TS-430S employs a lithium battery to back up stored memories.
The life of the battery is approximately five years.
If the display indicates 14.000.0 MHz, USB when turning the POWER ON and OFF, this may show the lithium battery needs replacement. This should be performed by an authorized TRIO-KENWOOD service facility — either your dealer or the factory.

TS-430S SCHEMATIC DIAGRAM



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2. Place the Control CAL switch unit to ON.
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5. Turn the CAL switch OFF, Remove the calibration cable, and replace the cases.

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Model TS-430S

Serial No. 4040742

Date of Purchase

Dealer

A product of

TRIO-KENWOOD CORPORATION

17-5, 2-chome, shibuya, shibuya-ku Tokyo 150, Japan

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TRIO-KENWOOD COMMUNICATIONS, GmbH
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Leuvensesteenweg 504, B-1930 Zaventem, Belgium
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Calibration Cable TS-430S
(E31-2154-05)

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KENWOOD

SERVICE MANUAL

TS-430S FM-430,MB-430, SP-430,PS-430

HF TRANSCEIVER

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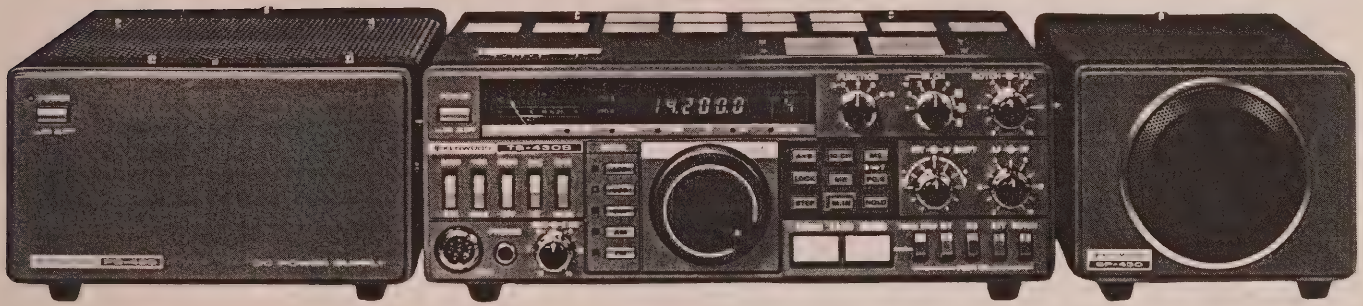
KENWOOD

SERVICE MANUAL

TS-430S

FM-430, MB-430, SP-430, PS-430

HF TRANSCEIVER



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PG 18 CR2032 LITHIUM BATTERY

SPECIFICATIONS

[GENERAL]

Transmitter Frequency Range: 160, 80, 40, 30*, 20, 17*, 15, 12*, 10 meter Amateur bands
Receiver Frequency Range: 150 kHz to 30 MHz
Mode: A3J (LSB, USB), A1 (CW), A3 (AM), F3
Antenna Impedance: 50Ω
Power Requirement: 12.0 to 16.0 V DC (13.8 V nominal)
Power Consumption: 20A approx. in transmit mode
1.2A approx. in receive mode
Dimensions: 270 (10.6)W × 96 (3.8)H × 275 (10.8)D mm (inch)
Weight: 6.5 kg (14.3 lbs.)

[TRANSMITTER]

Final Power Input:

Mode Band	SSB	CW	FM	AM
160m – 15m band	250WPEP	200WDC	–	60W
10m band	250WPEP	200WDC	120W	60W

Modulation:
SSB = Balanced Modulation
FM = Variable Reactance Direct Shift
(with FM-430 optional accessory)
AM = Low Level Modulation (IF stage)
Carrier Supression: Better than 40 dB
Unwanted Sideband Suppression: Better than 50 dB
Harmonic Content: Less than −40 dB
Maximum Frequency Diviation (FM): ±5 kHz (with FM-430 optional accessory)
Microphone Impedance: 500Ω to 50 kΩ

[RECEIVER]

Circuitry: SSB, CW, AM = Double conversion Superheterodyne
FM = Triple Conversion Superheterodyne
Intermediate Frequency: 1st IF = 48.055 MHz
2nd IF = 8.83 MHz
3rd IF = 455 kHz (only FM)

Sensitivity:

Frequency Mode	150kHz – 500kHz	500kHz – 1.8MHz	1.8MHz – 30MHz
SSB/CW(10 dB S/N)	Less than 1 μV	Less than 4 μV	Less than 0.25 μV
AM(10 dB S/N)	Less than 13 μV	Less than 40 μV	Less than 2.5 μV
FM (30 dB S/N)	–	–	*Less than 1 μV
FM (12 dB SINAD)	–	–	*Less than 0.4 μV

* with FM-430 optional accessory

Image Ratio: More than 70 dB (1.8 to 30 MHz)
More than 50 dB (FM-3rd image ratio)
IF Rejection: More than 70 dB (1.8 to 30 MHz)

Selectivity:

Selectivity Mode	−6 dB	−60 dB
SSB/CW	2.4 kHz	4.4 kHz
AM *1	6 kHz	12 kHz
FM *2	15 kHz	32 kHz

* 1 with YK-88A optional filter
* 2 with FM-430 optional accessory

Frequency Stability: Better than ± 30×10^{-6} (0°C to +50°C), Within ±200 Hz from 1 to 60 minutes after turn-on: within ±30 Hz any 30 minutes period thereafter
Frequency Accuracy: Better than 10×10^{-6}
RIT Variable Range: More than ± 1 kHz
Audio Output Impedance: 4Ω to 16Ω
Audio Output Power: More than 1.5W across 8Ω (at 10% distortion)

* Will transmit on the new 30, 17 and 12 meter bands, Diodes have been installed to prevent accidental transmission. They may be removed easily when government authorization has been granted for Amateur operation.

Note: Circuit and ratings subject to change without notice due to developments in technology.

CIRCUIT DESCRIPTION

OVERVIEW

The TS-430 is a transceiver and general-coverage receiver featuring double conversion at 48.055 and 8.830MHz intermediate-frequencies. Triple-conversion to 455kHz is used during FM receive operation. A microprocessor based 10Hz or 100Hz step switchable digital VFO system is employed for frequency control. The PLL system reference is a 36MHz master oscillator.

The following features are provided with the TS-430 : dual digital VFOs, 8 memory channels, memory scan, programmable band scan, IF shift, RIT, VOX, CW side tone, speech processor, NB, AF notch, squelch, F step, F lock, Mic UP/DWN.

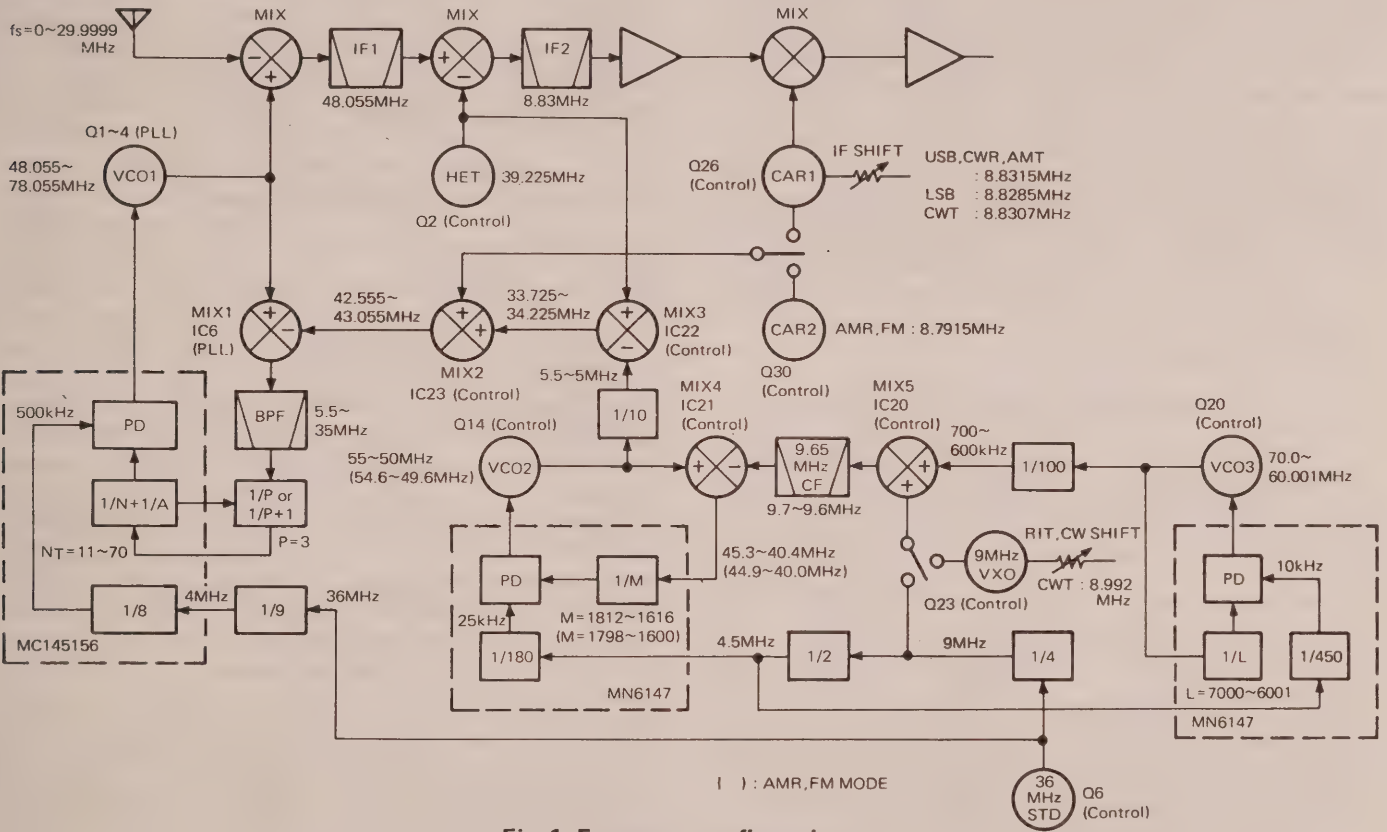


Fig. 1 Frequency configuration

RECEIVER CONFIGURATION

The TS-430 uses a double conversion receiver with a 48.055 MHz 1st intermediate frequency and 8.830MHz 2nd IF for SSB, CW, and AM modes. Triple conversion is used for the FM mode, in which the 3rd IF is 455kHz.

A signal from the antenna passes through one of seven LPF (Low Pass Filters) on the LPF unit, the antenna relay RL1, and enters the RF unit RA terminal. It then passes through the 20dB ATT (ATTENUATOR), controlled by Q14, a 30MHz LPF, the LPF for each band (a combination HPF and LPF for the 0.5 through 1.6MHz band), and the final LPF. The signal is then converted from an unbalanced to a balanced signal by broad-band transformer T2, and is mixed at Q1 & Q2 (JFET's) with the local oscillator signal from the PLL to arrive at the 48.055kHz 1st IF.

The signal passes through the MCF (Monolithic Crystal Filter), is post-amplified by Q3 (3SK74) and mixed at Q5, Q6 (2SK125), the 2nd balanced mixer with the 39.225MHz HET (Heterodyne) signal from the PLL to provide the 8.830MHz 2nd IF. A sample of the signal is picked off and amplified by the NB (Noise Blanker) chain (Q8–Q13). The main portion of this 2nd IF signal passes through the NB gate (D28–D31). The NB is also triggered by Q33, Q34 from a pulse signal supplies off the Control unit at PLL reset. This suppresses the "click" normally heard when one of the PLL loops resets. The signal is then fed to two outputs : one for the SSB, AM and CW modes, which is supplied to the IF unit, and the other, which is amplified by Darlington Pair Q7, Q43 and supplied to the (optional) FM unit. The signal supplied to the IF unit first passes through the MCF for the selected mode and is then amplified by three stages of IF amplification Q1–Q3 (3SK73 x 3). In the SSB and CW modes, the signal from the amplifiers is detected by the product detector D21–D24 (1N60 x 4).

The audio signal in any mode passes through the notch filter IC1 and IC2 (AN6551 x 2) and then the squelch-switching transistor Q46 (2SC2240) ; the output of the transistor is supplied to the AF GAIN control. Q47, Q18, Q19 and Q33 are the squelch control chain for all modes but FM. In the AM mode circuit, the IF output is ampli-

CIRCUIT DESCRIPTION

fied by Q5. The AGC buffer, and AM detected by D20 (1N60). Its output is fed to the notch filter via buffer amplifier Q6 (2SC2240). D38 and D39 are the AGC rectifiers, Q16 is the AGC amplifier, and Q17 is the AGC-slow time constant switch. Q13 and Q24 are the S meter amplifiers, while in the FM mode Q15 "kills" the IF unit S meter signal : The FM unit supplies the S meter signal during FM operation. In the FM mode, the RF unit FMI output is delivered to the FM unit, where the signal is input to Q5 : MC3357P, a monolithic IC containing the second conversion oscillator, mixer, limiting amplifier, quadrature discriminator, active filter, squelch, scan control, and mute. Q4 : 2SC2240 buffers the detected output and returns this audio signal (via the FAF line) to the IF unit, D26 switch.

FM signal meter drive (FSM) is derived through amplifiers Q6, Q7 : 2SC1815 (Y), transformer T3, and rectifiers D5, D6 : 1N60. The low level audio signal from the AF GAIN control is power amplified by IC5 (μPC2002V), and is then output to the speaker.

Item	Rating
Nominal center frequency	8830kHz
Center frequency deviation	Within ±150Hz at 6dB
Pass bandwidth	±1.2kHz or more at 6dB
Attenuation bandwidth	±1.5kHz or less at 20dB ±2.2kHz or less at 60dB ±3.0kHz or less at 80dB
Ripple	20dB or less
Insertion loss	6dB or less
Guaranteed attenuation	80dB or more within ±3kHz to 1MHz
Input and output impedance	600Ω//15pF

Table 1 MCF (L71-0208-05) YK-88S (IF unit XF1)

Item	Rating
Nominal center frequency	48.055MHz±1kHz
Pass bandwidth	±9.6kHz or more at 3dB
Attenuation bandwidth	±28kHz or less at 10dB
Lipple	0.7dB or less
Insertion loss	2dB or less
Guaranteed attenuation	30dB or more within ±1MHz
Input and output impedance	2kΩ±10%

Table 2 MCF (L71-0214-05) (RF unit XF)

Item	Rating
Center frequency fo	8830.7kHz
Center frequency deviation	fo ±150Hz at 6dB
6dB bandwidth	±250Hz or more
60dB bandwidth	±900Hz or less
Ripple	2dB or less
Loss	6dB ±2dB
Guaranteed attenuation	80dB or more within fo ±2kHz to ±1MHz
Input and output impedance	600Ω/15pF

Table 3 CW crystal filter YK-88C (L71-0211-05) Option

Item	Rating
Center frequency fo	8830.7kHz
Center frequency deviation	fo ±50Hz at 6dB
6dB bandwidth	±125Hz or more
60dB bandwidth	±600Hz or less
Ripple	2dB or less
Loss	8dB ±2dB
Guaranteed attenuation	80dB or more within fo ±2kHz to ±1MHz
Input and output impedance	600Ω/15pF

Table 4 CW crystal filter YK-88CN (L71-0221-05) Option

Item	Rating
Center frequency fo	8830kHz
Center frequency deviation	8830kHz ±150Hz at 6dB
6dB bandwidth	±900Hz or more
60dB bandwidth	±1800Hz or less
Guaranteed attenuation	80dB or more within fo ±2.5kHz to ±1MHz
Ripple	2dB or less
Loss	3dB ±2dB
Input and output impedance	600Ω/15pF

Table 5 SSB crystal filter YK-88SN (L71-0220-05) Option

Item	Rating
Center frequency (fo)	8831.5kHz±250Hz
−6dB bandwidth	6kHz
Attenuation bandwidth	11kHz
Guaranteed attenuation	80dB or more
Ripple	2dB or less
Loss	3dB±2dB
Input and output impedance	600Ω//15pF
Temperature	−10°C~+50°C

Table 6 AM crystal filter YK-88A (L71-0223-05) Option

CIRCUIT DESCRIPTION

TRANSMITTER CONFIGURATION

This transceiver uses a dual conversion transmitter for all operating modes. The audio signal from the microphone is delivered to the IF unit X48-1370-00 for preamplification by Q34, 2SC2240GR. The output from this stage is routed to three circuits. The amplified audio signal continues either to the microphone gain control through emitter follower Q48, 2SC1815Y, or at processor ON, through IC6, μPC1158H2, the processor audio amplifier. Q35 2SC1815Y is the processor AGC amplifier, and establishes the degree of compression, while Q37, 2SC945R is a switch, operated at processor ON, which interrupts the normal, non-processed signal flow. The secondary destinations of Q34's output are the VOX circuit input, and the (optional) FM unit microphone input.

Returning from the microphone gain control, the audio signal is amplified by Q38, 2SC2240GR, and input to the balanced modulator IC7, AN612, along with the 8.8MHz carrier signal developed on the Control unit. In the AM mode, the modulator is unbalanced to output a modulated carrier, while in the CW mode, the modulator is unbalanced and amplifier Q38 is disabled to yield only a controlled carrier (D66, Pin Diode) from IC7. This signal is diode switched (D17, D16, D3) through the 8.8kHz MCF (Monolithic Crystal Filter), and thence to the TX IF amplifier Q41, 3SK73GR. Q27 is the CW keying transistor used to control Q41's operating voltage. ALC is also applied to Q41. Q42 and Q43 are the ALC meter amplifiers, while Q44 "kills" the SSB, CW or AM ALC during FM mode operation. Q32 is a phase-shift audio oscillator supplying sidetone in the CW mode.

The signal then exits the IF unit and is sent to the RF unit via the TIF line. On the RF unit X44-1510-11, the signal is up-converted, mixed with the VCO (voltage controlled oscillator) output, then amplified and sent on to the Final Amplifiers. Q15 and Q16, 3SK73GR are the HET (heterodyne) mixers. The 39.225MHz HET injection signal originates on the Control unit, and is amplified by Q4, 2SC1959Y. In the FM mode, the TIF signal is diode switched off (D35), while the FM unit transmit signal output (FMT) line is switched on (D36) into the HET mixers.

In the FM mode, the audio signal from the Switch unit "L" goes to the FM unit via the FMC line. In the FM-430 unit, the MIC signal is amplified and limited by Q1 : TA7061AP, an OP AMP, and is applied to varicap diode D1 : 1S2208 to modulate crystal X1.

The 8831.5kHz carrier output generated by oscillator Q2 (2SC460) and amplified Q3 (3SK74) is fed via the FMT line back to the RF unit (connector 20) and into the transmitter balanced mixers (Q15, Q16 : 3SK74).

The output of this mixer stage is filtered and immediately mixed with the VCO output by Q17 and Q18, 3SK73GR. The VCO signal also originates on the Control unit. Q19, 2SK125 is a source follower, which feeds Q20, 2SC2538, the pre-driver amplifier. The Drive signal is then sent to the Final unit for amplification.

During XVRTR (transverter) operation, Q23, 2SC1959Y operates as an emitter follower from Q19, supplying a low level transmitter signal output through the XVRTR port. At the same time, Q21, 2SC2703 turns off Q20 to interrupt the normal transmitter signal flow from the RF to the Final unit.

In the Final unit X45-1280-00, the signal is amplified by Q1, 2SC2075, then push-pull amplified by Q2 and Q3, 2SC2509. Q4 and Q5 2SC2290 are the final push-pull amplifiers. D4 and Q6 are the driver bias control elements, and D5 and Q7 are the final transistor bias circuit. The Final unit output is then sent to the Filter unit.

In the Filter unit X51-1290-00, the transmitter output is filtered by one of seven filter circuits, automatically selected from the Control unit. ALC and SWR protection sensing are provided by T1, a toroidal directional coupler, and Q3 and Q5, 2SC1815Y.

RECEIVER ANCILLARY CIRCUITS

NOTCH CIRCUIT

IC11 and IC2 in the IF unit constitute a Bi-Quad filter circuit. The notch frequency is determined by the followwing two formulas.

(1) $f_N = \sqrt{R6}/2\pi\sqrt{R3 \cdot R5 \cdot R1 \cdot C1 \cdot C2}$

(2) $R1 \cdot R6 = R4 \cdot R7$

If a variable resistor is used for resistor R3, the notch frequency can be controlled according to formula (1). The notch frequency range is from 350 to 2800Hz, and attenuation is from 25 to 50dB. The correlation between the formula and circuit diagram resistor & capacitor values is :

R1 = R80
C2 = C52
R8 = R77
C1 = C51
R4 = R75
R2 = R81
R3 = R88 + Notch control
R1 = R79
R5 = R76

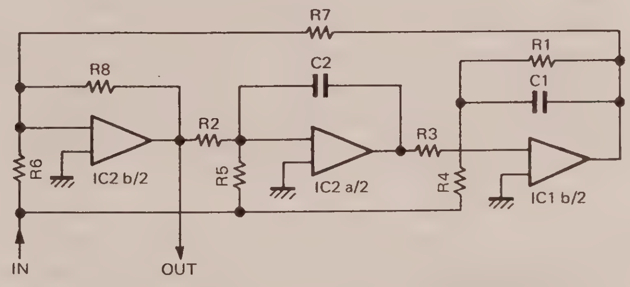


Fig. 2 Theoretical circuit diagram

CIRCUIT DESCRIPTION

TRANSMITTER ANCILLARY CIRCUITS

PROTECTION CIRCUTS

The transmitter output circuit is triple-protected.

- **VSWR Protection**

Reflected power detected by current transformer T1 is rectified by diode D3, amplified by transistor Q3 and added to the ALC circuit. When the VSWR is high, the ALC circuit reduces the drive signal into the power amplifiers.

- **Heat Sink Temperature Protection**

Thermister TH1, mounted on the Final unit heat sink is connected to the inverting inputs of comparators IC1 sections c & d. If the thermistor resistance decreases, due to an excessive increase in heat sink temperature, comparator "d" turns on before comparator "c" since "d's" reference voltage is established higher than that of section "c's". Comparator "d's" output turns on Q6 which starts the fan motor. If the heat sink's temperature continues to rise, due, for example, to continuous transmission or an incorrect load, comparator section "c" turns on Q1 to add a negative D.C. voltage to the ALC circuit. The ALC circuit then forcibly curtails the drive input to the Final unit.

The comparator reference voltages are established for fan turn-on at approximately 65°C, and drive shut-down at approximately 90°C. The fan stops at 60°C because of the hysteresis provided for comparator section "d".

- **Protection using RF voltage**

The transmitter may be overdriven, although the VSWR is not particularly high, depending on the load connected to the antenna terminal. Excessive drive power could exert stress on the Final unit driver transistor 2SC2509. To protect the driver transistor, RF voltage at the emitter of pre-driver 2SC2075 is rectified, amplified by Filter transistor Q2, and added to the ALC circuit. When the RF voltage at the pre-driver is excessive, the ALC circuit reduces the drive power.

VOX (Voice Operated Transmit)

The VOX circuit is contained on the RF unit, Q24 is the VOX amplifier. Q25 & Q26 supply VOX delay. Q27 & Q28 are a Schmitt Trigger used to control RX & TX voltage switching. The speaker-derived ANTIVOX signal is amplified by Q29, Q30 & Q32 and is applied to Q25 to hold-off the VOX from keying on speaker output. In the CW mode, ANTIVOX is disabled by Q31.

PLL CIRCUIT

The TS-430 PLL circuit consists of three phase locked loops and a 36MHz master oscillator to generate all reference frequencies. PLLs 2 & 3 are on the Control unit, and PLL 1 is on the PLL unit. PLL3 uses an MN6147 (IC7) which contains a phase comparator, programmable frequency divider and frequency divider for generating the reference frequency. This IC uses a 10kHz reference frequency, and controls VCO3 to generate frequencies from 70 to 60MHz in 10kHz steps. The 36MHz signal is divided by 8 to 4.5MHz before it is input to PLL3. In PLL3, the 4.5MHz signal is divided by 450 to generate the 10kHz reference signal. The microcomputer (IC1) applies 4-bit serial program data, plus 1 clock data bit to the programmable divider to vary the division ratio from 1/7000 to 1/6001.

The 70 to 60MHz signal generated by VCO3 (Q20 : 2SC1923) is divided by 100 by IC18 (M54459L) to obtain output from 700 to 600kHz. The result is then mixed with the 9MHz reference signal by MIX5 (IC20 : SN16913P) to produce a 9.7 to 9.6MHz signal which is applied to MIX4 (IC21) through a ceramic filter.

PLL2 also uses an MN6147 (IC8). This IC uses 25kHz as its reference frequency and controls VCO2 (Q14) to generate frequencies from 55 to 50MHz. The signal output by VCO2 is mixed with the 9.7 to 9.6MHz signal generated by PLL3 in MIX4 (IC21 : SN16913P) to obtain a 45.3 to 40.4MHz signal, which is applied to the programmable divider in the PLL IC (IC8). The programmable divider uses a division ratio from 1/1812 to 1/1616. Since the divisor is changed in 4 steps, the VCO2 output signal frequency varies from 55 to 50MHz in 100kHz steps.

VCO2 output is divided by 10 at IC19 (μPB551C), then mixed with the 39.225MHz heterodyne signal by MIX3 (IC22 : SN16913P). The resultant 33.725 to 34.225MHz signal (varied in 10Hz steps) is mixed with the 8.83MHz carrier by MIX2 (IC23 : SN16913P) to generate the 42.555 to 43.055MHz signal which is applied to the PLL unit, MIX1 (IC6) in the PLL1 loop. PLL1 uses 4 VCOs (Q1–Q4) to generate the 48.055 to 78.055MHz VCO signal. It uses an MC14156P PLL IC (IC1) and SN74LS112N (IC2) as a swallow (High Speed) counter (with a division ratio of 1/3 or 1/4). the 36MHz reference signal is divided by 9 at IC5 (M74LS112AP) and IC4 (M74LS196P) to obtain a 4MHz signal, and this 4MHz signal is applied to IC1, where it is divided by 8 to obtain the 500kHz reference signal.

The 48.055 to 78.055MHz signal generated by VCO1 is mixed with the signal from PLL2 by MIX1 (IC6) to generate the 5.5 to 35MHz signal. This signal is applied to the programmable divider in the PLL IC (IC1) through the swallow counter. The microprocessor outputs 3-bit serial data to vary the division ratio (N) from 11 to 70. Thus, PLL1 operates as a PLL using a 500kHz reference signal.

Item		Rating
Nominal center frequency (ƒo)		9.65MHz
3dB Attenuation bandwidth		ƒo±80kHz or more
Insertion loss		6dB or less $20 \cdot \log\left(\frac{E1}{2E2}\right)$
Guaranteed attenuation at 9MHz		40dB or more
Spurious	(within 9.65+2MHz)	30dB or more
	(within 9.65–2MHz)	35dB or more
Voltage capacity		DC50V 1minute
Input and output impedance		330Ω

Table 7 Ceramic filter (L72-0336-05)
(Control unit CF1)

CIRCUIT DESCRIPTION

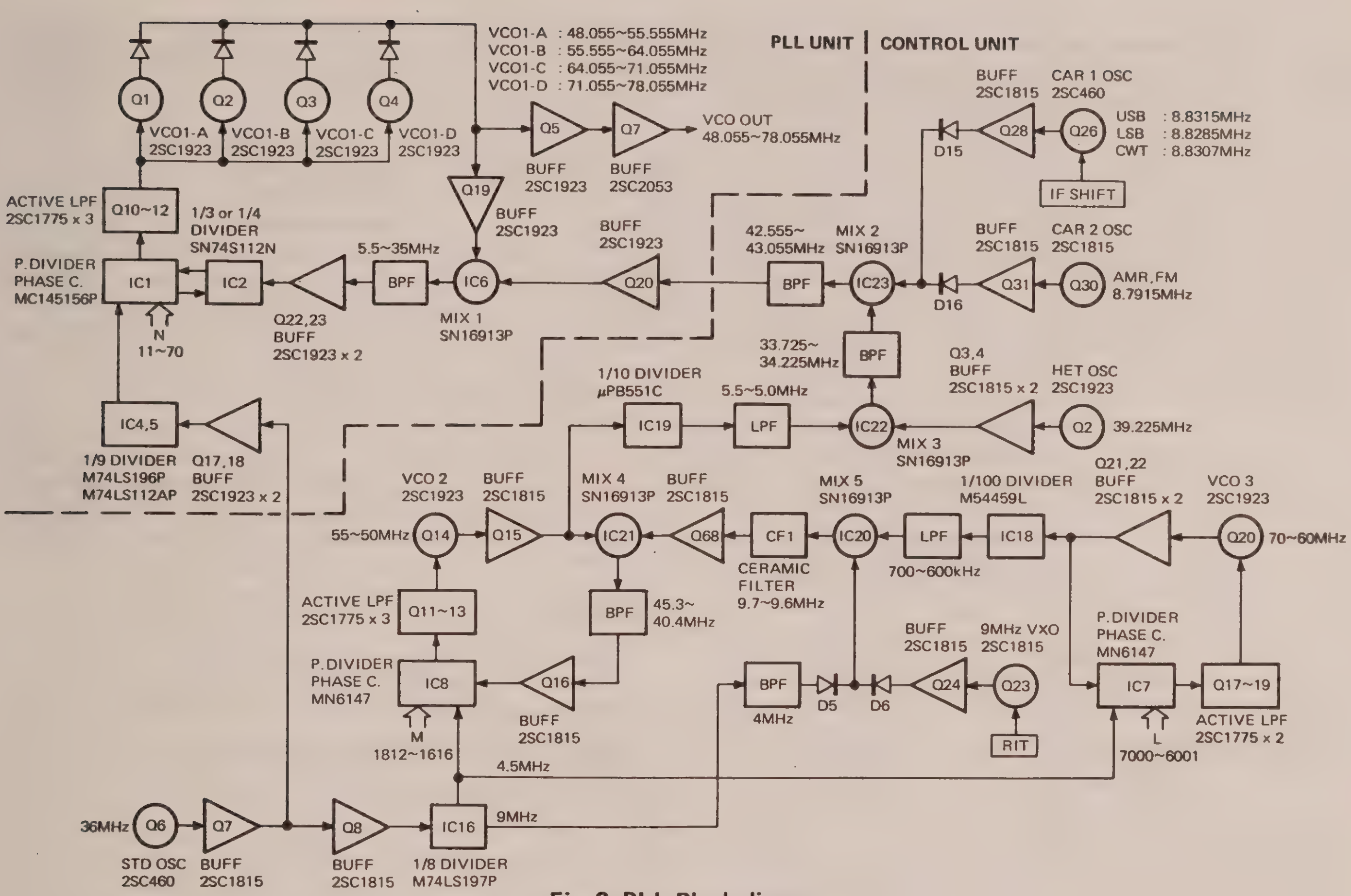


Fig. 3 PLL Block diagram

DIGITAL CONTROL CIRCUIT

The TS-430 digital Control unit consists of a µPD8049C-279 8-bit microcomputer (IC1), 2 I/O expanders, 2 data selectors, a C-MOS RAM IC for memory and a diode matrix for interfacing.

The MODE SW, BAND SW, M-IN, MR, A=B, HOLD, STEP, MIC UP/DOWN and LOCK switches are connected to the data selectors (IC4 and IC5 : TC4512BP) either directly or through the diode matrix so that the setting of each switch is input to the microcomputer as 1 data bit. The FUNCTION, MEMORY CH, MS and PG.S SW switches are also connected to the microcomputer through the diode matrix. Thus, the settings of these switches are input to the microcomputer as 4 data bits.

I/O expander IC3 (µPD8243C) is used to output the frequency division data for the PLLs and the band data. The frequency division data is changed only when the frequency is changed. The frequency range from 0 to 30MHz is divided into 10 band segments, and these segments are selected by band data which is output as 4-bit BCD code. The other I/O expander (IC2) outputs frequency data for the 7-segment display and the digit dynamic drive signal. The clock signal used to dynamically drive the display is generated by astable multivibrator IC14 (TC4011BP), which oscillates at approximately 1 kHz.

The encoder interface circuit (consisting of IC9, IC10 and IC11 [TC4011BPs]) multiplies the 250 pulses/rev. 2-phase clock signal generated by the encoder unit by 4 to obtain a 1000 pulses/rev. clock signal which is applied to the microcomputer. The relationship between the phases is detected by IC13 to determine the tuning knob direction of rotation, and this directional data is applied to the microcomputer as the UP/DOWN signal.

The microcomputer clock signal input terminal is also used to input the speed control data for program scan. A clock signal generated by astable multivibrator IC12 (TC4011BP) is applied to this terminal in the program scan mode. The frequency of this multivibrator can be varied from 50 to 250 Hz by the slide potentiometer located on the top panel.

The memory backup circuit uses a C-MOS RAM (IC6 : µPD5101LC) and a 3V lithium battery. The microcomputer monitors the main power supply voltage using a circuit consisting of D22 (RD9.1EB2) Q38 and Q39 (2SC1815s). When the voltage (normally 13.8V DC) drops below about 9.5V, the microcomputer stops normal operation and starts transferring frequency data to the backup RAM (IC6 : µPD5101LC). The microcomputer then detects a drops in the 5V line voltage and sets the RAM in the standby (or bakcup) state. Current consumption during backup is approximately 0.1µA (typ.), and the built-in lithium battery can backup the RAM for about 5 years. Various keyboard functions have a telltale audio "Beep" heard through the speaker. The control pulse is fed to the IF unit to trigger multivibrator Q30 & Q31, whose output is fed directly to the AF Power amplifire IC5.

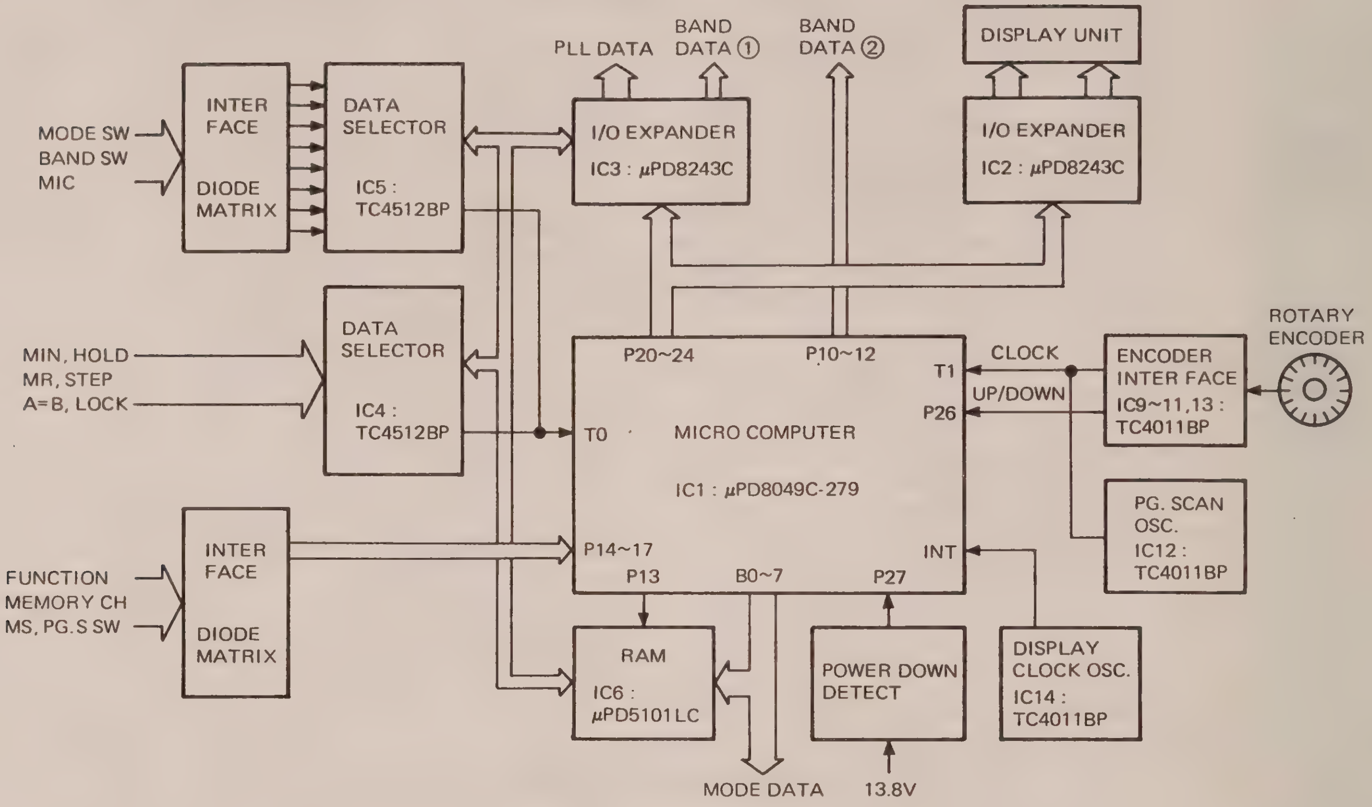


Fig. 4 Digital control system

Terminal No.	Name	Function	Terminal No.	Name	Function
1	T0	Encoder clock, P. SCAN clock input	21	P20	I/O EXPANDER control output
2	XTAL 1	Micro computer clock (5.74MHz) input	22	P21	
3	XTAL 2		23	P22	
4	$\overline{\text{RESET}}$	Microcomputer reset input operate : "H"	24	P23	
5	$\overline{\text{SS}}$	Normally "H" (5V)	25	PROG	
6	$\overline{\text{INT}}$	Display tube dynamic drive clock input (1 kHz)	26	VDD	Power supply 5V
7	EA	Normally "L" (GND)	27	P10	TX inhibit signal (Out of hum band)
8	$\overline{\text{RD}}$	Not used, normally open	28	P11	TX inhibit signal (Out of hum and WARC band)
9	$\overline{\text{PSEN}}$		29	P12	28MHz Power down output
10	WR		30	P13	External RAM control output (R/W)
11	ALE		31	P14	P. SCAN input — M.CH selector input
12	DB0	VFO A indicator output	32	P15	M. SCAN input
13	DB1	VFO B indicator output	33	P16	FUNCTION input
14	DB2	No memory signal output — "L" : Normal	34	P17	FUNCTION input M.CH input
15	DB3	MODE output LSB — "H" : When operating	35	P24	I/O Exp. data selector control output "L" : EX (0), DS (1) "H" : EX (1), DS (2)
16	DB4	MODE output USB	36	P25	External RAM control output (CE)
17	DB5	MODE output CW	37	P26	Encoder UP/DOWN input "L" : DOWN, "H" : UP
18	DB6	MODE output AM	38	P27	Voltage down detection signal input "L" : Power down "H" : Normal
19	DB7	MODE output FM	39	T1	Data selector input
20	GND	GND	40	Vcc	Power supply 5V

Table 8 Function of µPD8049C-279

CIRCUIT DESCRIPTION/SEMICONDUCTOR DATA

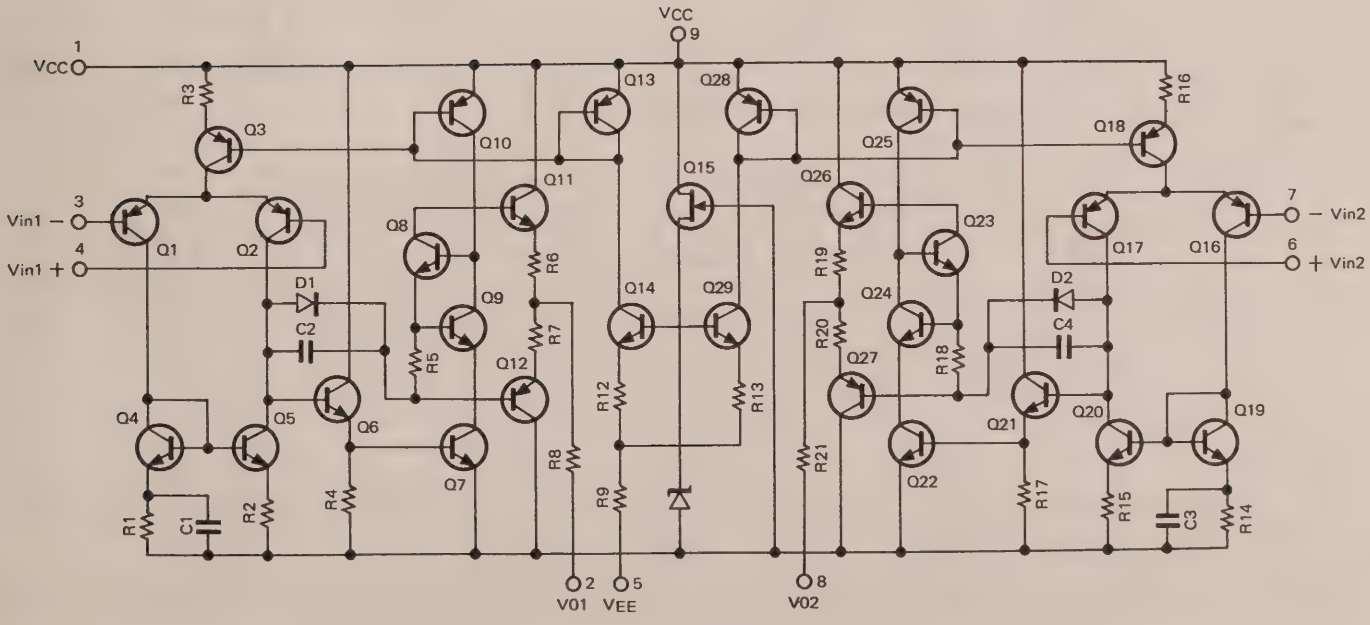
Terminal No.	Name	Function	
24	Vcc	Power supply 5V	
2	P40	BAND data (BCD output)	
3	P41		
4	P42		
5	P43		
6	$\overline{CS}$	Chip selector input	
7	PROG	Control input	
8	P23		
9	P22		
10	P21		
11	P20		
12	GND	GND	
13	P70	PLL 1 data output	PLL 2 3 data output
14	P71	PLL 1 clock output	
15	P72		
16	P73		
17	P63	PLL select signal Normally : "H"	
18	P62	PLL 1 ENABLE	
19	P61	PLL 2 clock output	
20	P60	PLL 3 clock output	
21	P53		External RAM data in-output
22	P52	Data selector output	
23	P51		
1	P50		

BAND data	Frequency
Band 0	0–0.5MHz
1	0.5–1.6MHz
2	1.6–2.5MHz
3	2.5–4MHz
4	4–6.5MHz
5	6.5–7.5MHz
6	7.5–10.5MHz
7	10.5–16MHz
8	16–23MHz
9	23–30MHz

Table 9 I/O EXPANDER (0) IC2: μPD8243C

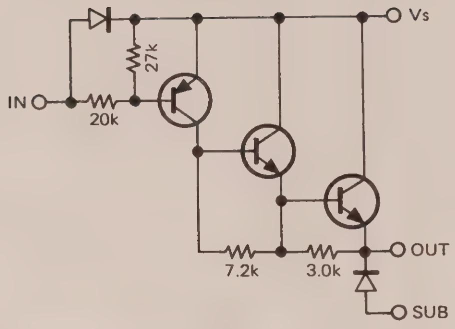
Terminal No.	Name	Function
24	Vcc	Power supply 5V
2	P40	DIGIT output 100Hz
3	P41	DIGIT output 1kHz
4	P42	DIGIT output 10kHz
5	P43	DIGIT output 100kHz
6	$\overline{CS}$	Chip selector input
7	PROG	Control input
8	P23	
9	P22	
10	P21	
11	P20	
12	GND	GND
13	P70	SEGMENT output e
14	P71	SEGMENT output f
15	P72	SEGMENT output g
16	P73	Buzzer output ON : "L"
17	P63	SEGMENT output d
18	P62	SEGMENT output c
19	P61	SEGMENT output b
20	P60	SEGMENT output a
21	P53	DIGIT output M.CH
22	P52	DIGIT output 10Hz
23	P51	DIGIT output 10MHz
1	P50	DIGIT output 1MHz

Table 10 I/O EXPANDER (1) IC3: μPD8243C

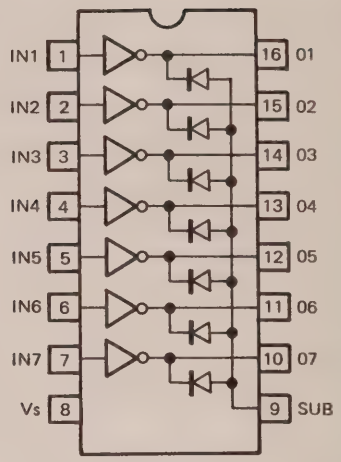


AN6551 Equivalent circuit (IF unit IC1,2)

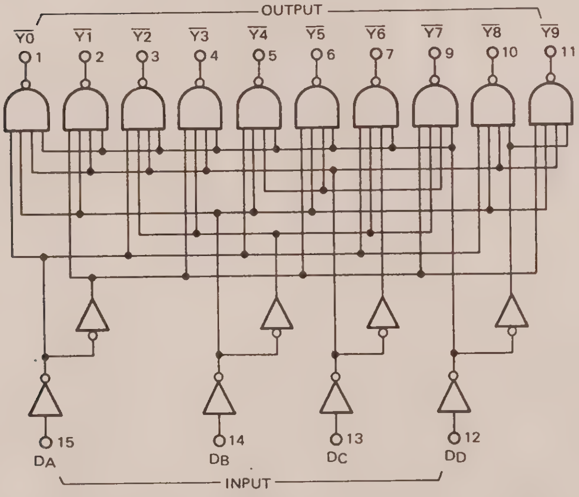
SEMICONDUCTOR DATA



M54561P Equivalent circuit (RF unit IC1)

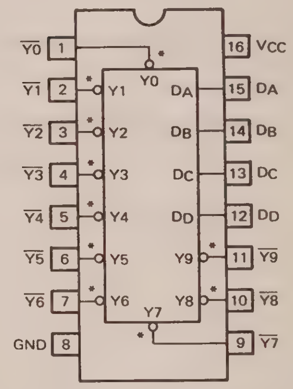


M54561P



M74LS145P Logic circuit (RF unit IC2)

* Open collector output

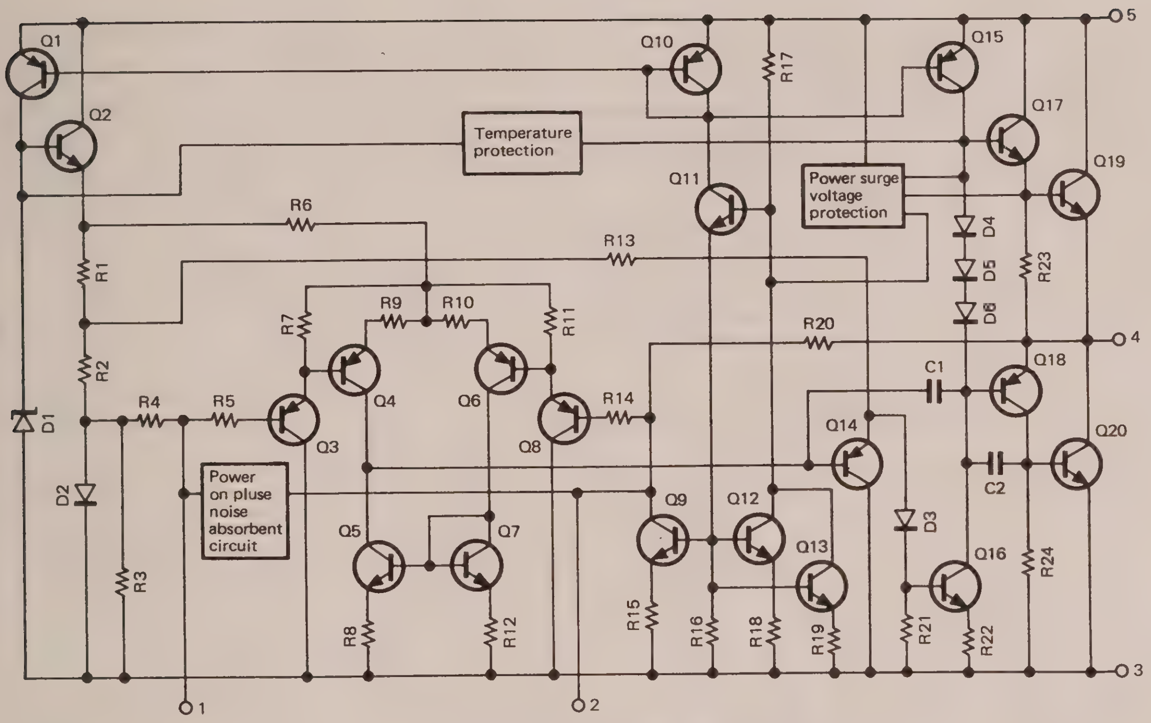


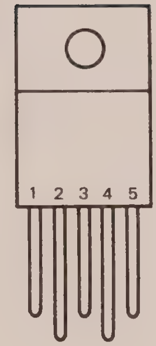
M74LS145P

	INPUT				OUTPUT									
Decade digit	DD	DC	DB	DA	$\overline{Y0}$	$\overline{Y1}$	$\overline{Y2}$	$\overline{Y3}$	$\overline{Y4}$	$\overline{Y5}$	$\overline{Y6}$	$\overline{Y7}$	$\overline{Y8}$	$\overline{Y9}$
0	L	L	L	L	L	H	H	H	H	H	H	H	H	H
1	L	L	L	H	H	L	H	H	H	H	H	H	H	H
2	L	L	H	L	H	H	L	H	H	H	H	H	H	H
3	L	L	H	H	H	H	H	L	H	H	H	H	H	H
4	L	H	L	L	H	H	H	H	L	H	H	H	H	H
5	L	H	L	H	H	H	H	H	H	L	H	H	H	H
6	L	H	H	L	H	H	H	H	H	H	L	H	H	H
7	L	H	H	H	H	H	H	H	H	H	H	L	H	H
8	H	L	L	L	H	H	H	H	H	H	H	H	L	H
9	H	L	L	H	H	H	H	H	H	H	H	H	H	L
10	H	L	H	L	H	H	H	H	H	H	H	H	H	H
11	H	L	H	H	H	H	H	H	H	H	H	H	H	H
12	H	H	L	L	H	H	H	H	H	H	H	H	H	H
13	H	H	L	H	H	H	H	H	H	H	H	H	H	H
14	H	H	H	L	H	H	H	H	H	H	H	H	H	H
15	H	H	H	H	H	H	H	H	H	H	H	H	H	H

M74LS145P Truth table

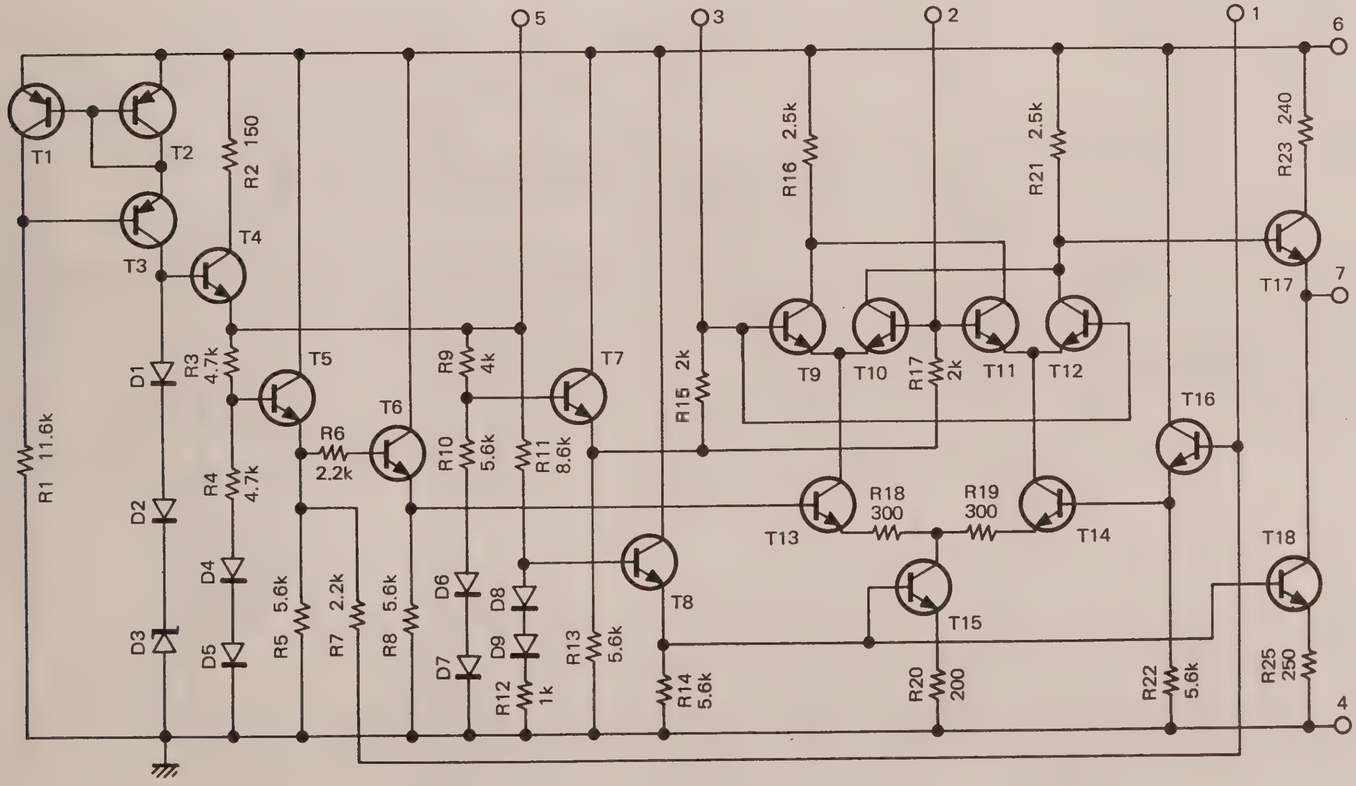
SEMICONDUCTOR DATA





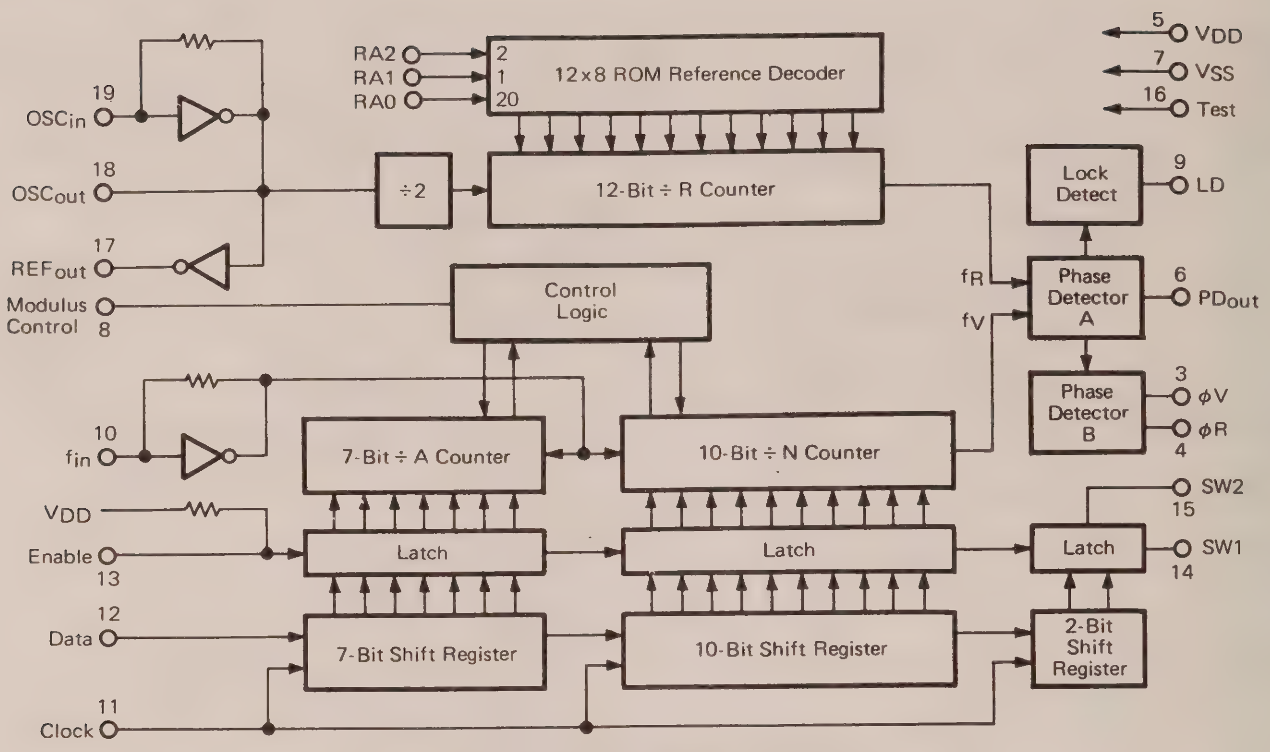
1 : Input
2 : NFB
3 : GND
4 : Output
5 : Power supply + Vcc

µPC2002V Equivalent circuit (IF unit IC5)

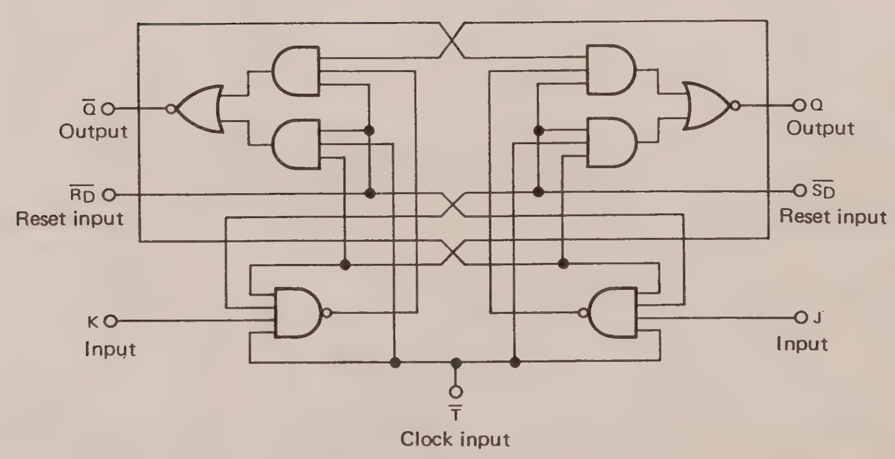


AN612 Equivalent circuit (IF unit IC7)

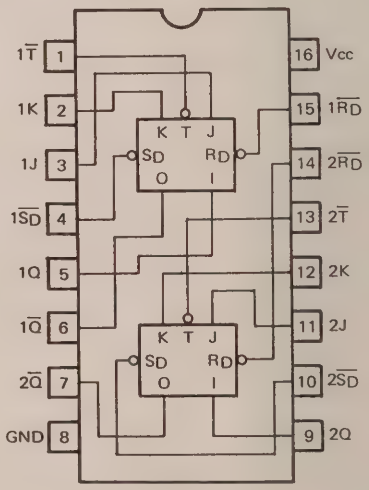
SEMICONDUCTOR DATA



MC14156P Block diagram (PLL unit IC1)

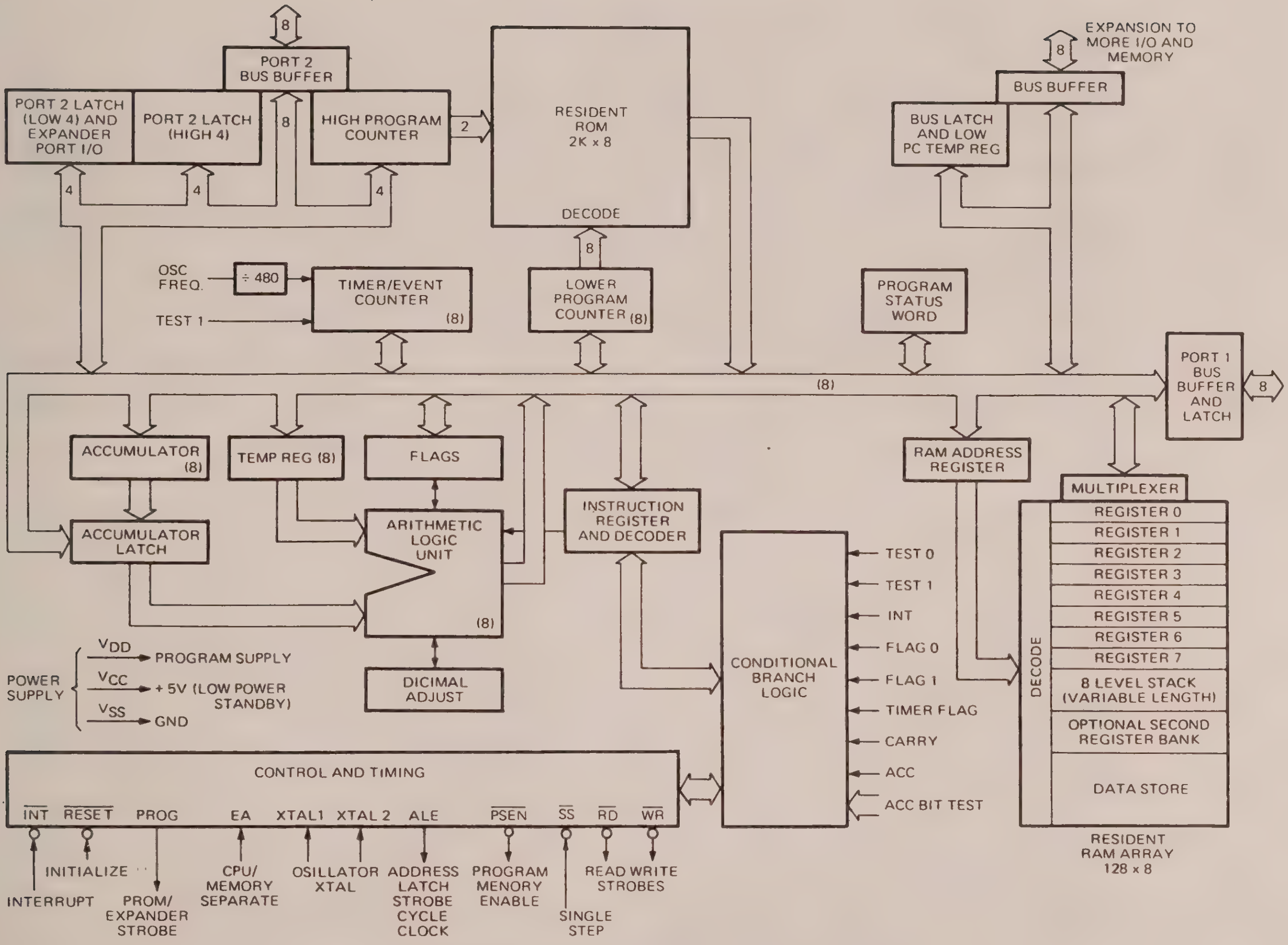


M74LS112AP Logic circuit (PLL unit IC5)

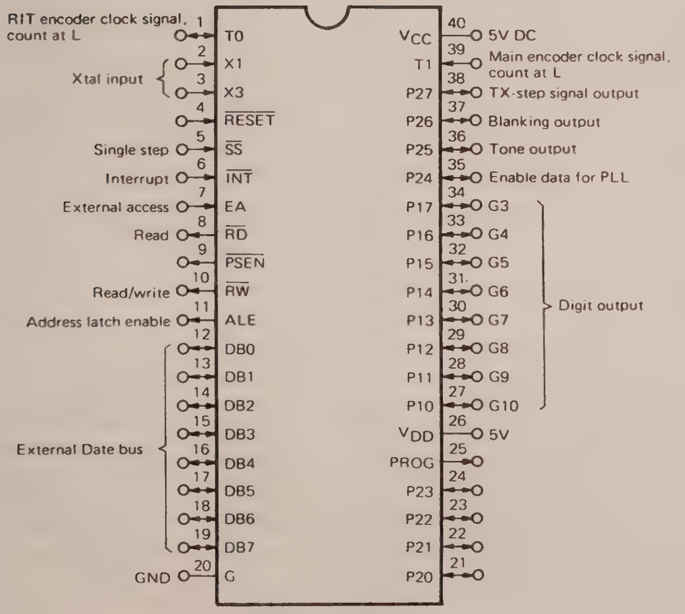


M74LS112AP

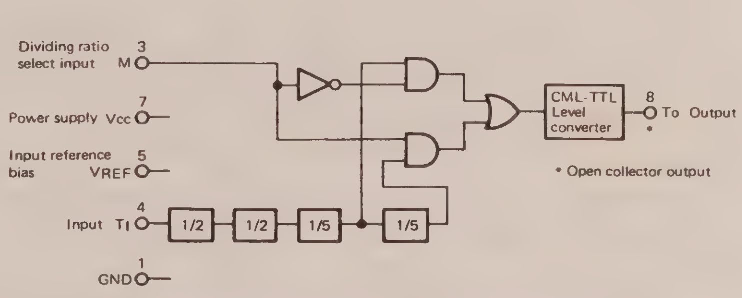
SEMICONDUCTOR DATA



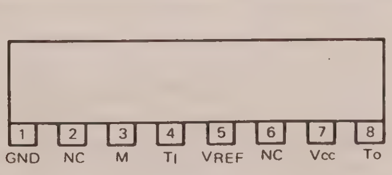
µPD8049C-279 Block diagram (Control unit IC1)



µPD8049C-279

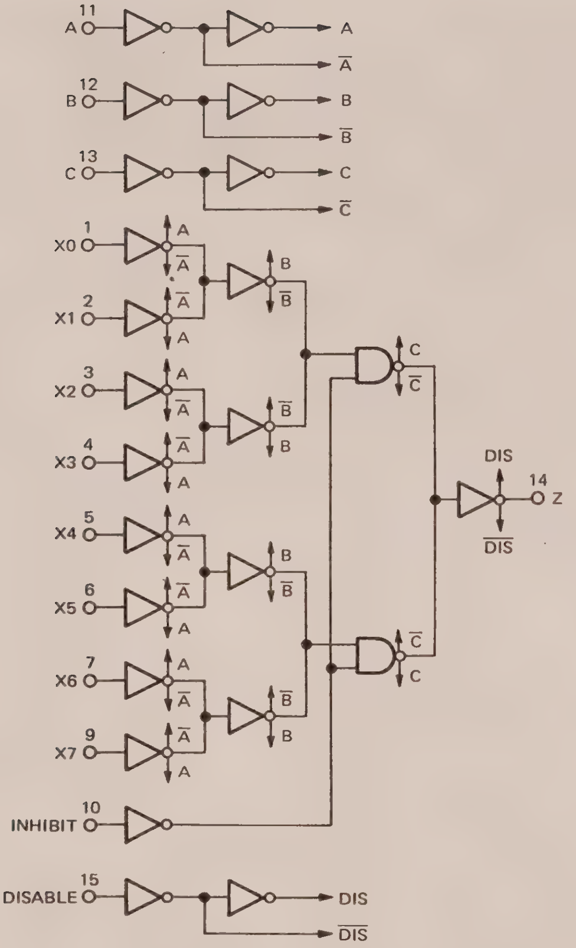


M54459L Block diagram (Control unit IC18)

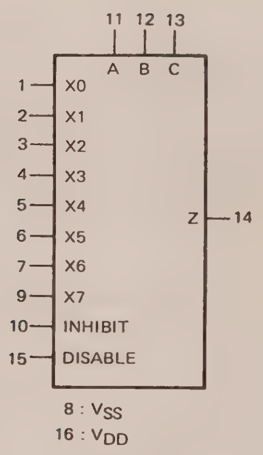


M54459L

SEMICONDUCTOR DATA



TC4512BP Block diagram (Control unit IC4,5)

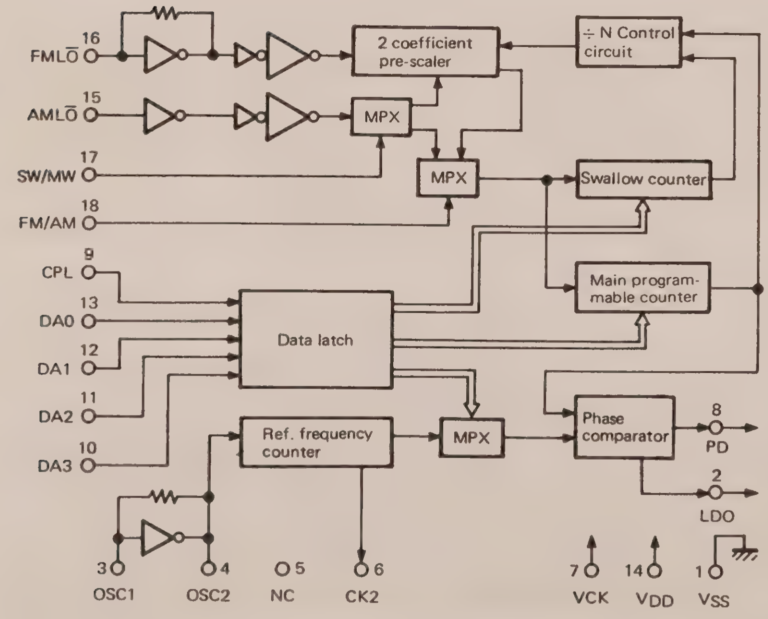


TC4512BP

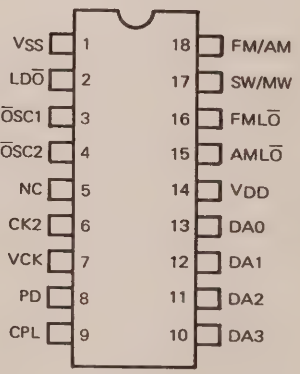
A	B	C	INHIBIT	DISABLE	Z
L	L	L	L	L	X0
H	L	L	L	L	X1
L	H	L	L	L	X2
H	H	L	L	L	X3
L	L	H	L	L	X4
H	L	H	L	L	X5
L	H	H	L	L	X6
H	H	L	L	L	X7
*	*	*	H	L	L
*	*	*	*	H	HZ

* : Don't Care
HZ : High Impedance

TC4512BP Truth table



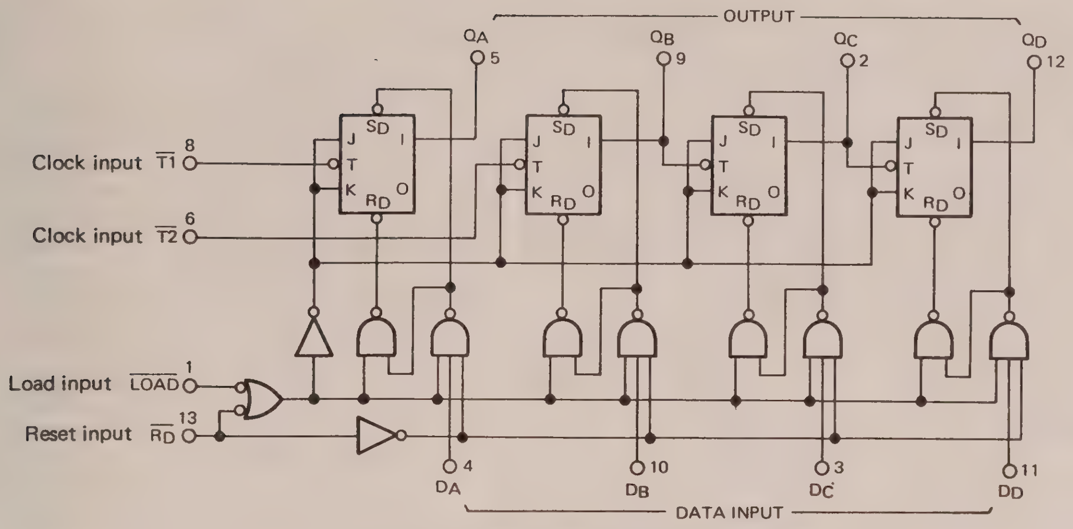
MN6147C Block diagram (Control unit IC7,8)



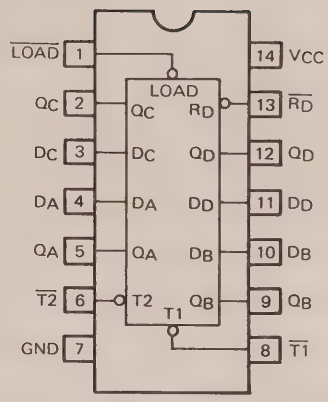
VSS	: Ground	CPL	: Latch clock
LDŌ	: OSC circuit output	DA3–DA0	: Data address
ŌSC1	: Ext. clock input	VDD	: Main power supply
NC	: No connection	AMLŌ	: AM local OSC input
CK2	: Clock output (1kHz)	FMLŌ	: FM local OSC input
VCK	: Clock circuit back up	SW/MW	: SW,MW select
PD	: Phase detector output	FM/AM	: FM,AM select

Clock output (1kHz)

SEMICONDUCTOR DATA



M74LS197P Logic circuit (Control unit IC16)



M74LS197P

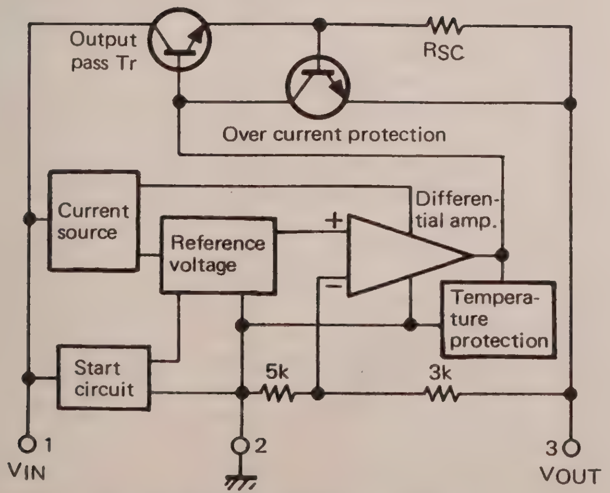
INPUT			OUTPUT			
$\overline{T}$	$\overline{R_D}$	$\overline{LOAD}$	Q_A	Q_B	Q_C	Q_D
X	L	X	L	L	L	L
X	H	L	D_A	D_B	D_C	D_D
↓	H	H	COUNT			

↓ : Change H to L
X : Either H or L

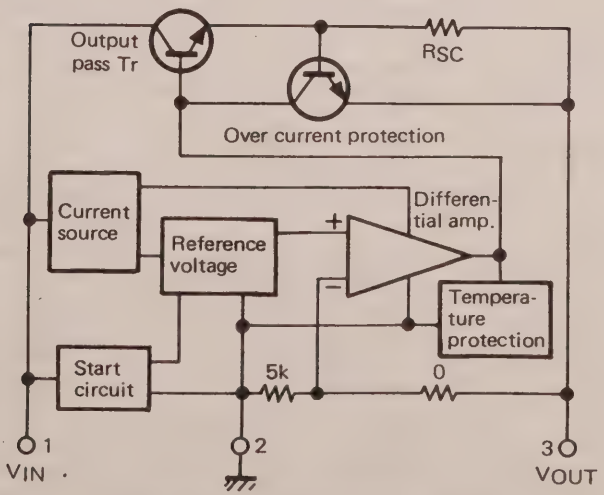
M74LS197P Truth table (1)

	OUTPUT			
COUNT	Q_A	Q_B	Q_C	Q_D
0	L	L	L	L
1	H	L	L	L
2	L	H	L	L
3	H	H	L	L
4	L	L	H	L
5	H	L	H	L
6	L	H	H	L
7	H	H	H	L
8	L	L	L	H
9	H	L	L	H
10	L	H	L	H
11	H	H	L	H
12	L	L	H	H
13	H	L	H	H
14	L	H	H	H
15	H	H	H	H

M74LS197P Truth table (2)



AN7808 Block diagram (IF unit IC8)



AN7805 Block diagram (IF unit IC9)

PARTS LIST

CAPACITORS

CC 45 TH 1H 220 J
1 2 3 4 5 6

1 = Type ..... ceramic, electrolytic, etc
2 = Shape ..... round, square, etc
3 = Temp coefficient
4 = Voltage rating
5 = Value
6 = Tolerance

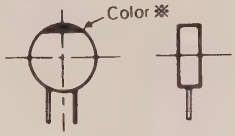
● Temperature coefficient

1st Word	C	L	P	R	S	T	U
Color ※	Black	Red	Orange	Yellow	Green	Blue	Violet
ppm/°C	0	−80	−150	−220	−330	−470	−750

2nd Word	G	H	J	K	L
ppm/°C	± 30	± 60	± 120	± 250	± 500

Example CC45TH = −470 ± 60 ppm/°C

CC45



● Rating voltage

2nd word / 1st word	A	B	C	D	E	F	G	H	J	K	V
0	1.0	1.25	1.6	2.0	2.5	3.15	4.0	5.0	6.3	8.0	—
1	10	12.5	16	20	25	31.5	40	50	63	80	35
2	100	125	160	200	250	315	400	500	630	800	—
3	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	—

● Capacitor value

0 1 0 = 1pF
1 0 0 = 10pF
1 0 1 = 100pF
1 0 2 = 1000pF = 0.001µF
1 0 3 = 0.01µF
2 2 0 = 22pF
1st number
2nd number
Multiplier

● Tolerance

Cord	C	D	G	J	K	M	X	Z	P	No cord
(%)	± 0.25	± 0.5	± 2	± 5	± 10	± 20	+ 40	+ 80	+ 100	More than 10µF −10 ~ + 50
							− 20	− 20	− 0	Less than 4.7µF −10 ~ + 75

Less than 10 pF

Cord	B	C	D	F	G
(pF)	± 0.1	± 0.25	± 0.5	± 1	± 2

Abbreviation		Abbreviation	
Cap	Capacitor	ML	Mylar
C	Ceramic	S	Styren
E	Electrolytic	T	Tantalum
MC	Mica		

Symbol	Destination
K	U.S.A.
W	Europe
T	Britain
M	General market

Resistors not listed in this parts list are standard, fixed carbon composition, 1/4W or 1/8W.
The resistance values, in ohms, are indicated on the schematic diagram.

SEMICONDUCTOR

N : New parts

Item	Re-marks	Name
Diode		1N60
		1S1007
		1S1555
		1S1587
		1S2588
		BA379
		ITT310
	N	LN66(R)
		S31C
		V06B
Vari-cap		1SV53A
		1SV54GC
Varistor		MV5T
		MV13
		SV03Y
Zener diode		BZ-240
		RD3.0EB2
		RD4.3EB3
		RD5.1EB1
		RD6.2EB1
		RD6.2EB2
		RD9.1EB2
		RD9.1EB3
		RD10EB1

Item	Re-marks	Name
LED	N	LN247RP
	N	LN347GP
	N	LN447YP
		SG238D
		SY438D
Surge absober		ERZC07DK201
		ERZD03DK331
Thermistor		25D29
		32D27
	N	SDT1000F
Display tube	N	FIP9D7
Photo TR	N	PN126S
TR		2SA562(Y)
		2SA733(R)
		2SA1015(Y)
		2SC460(B)
		2SC945(Q)
		2SC945(R)
		2SC1775(E)
		2SC1815(GR)
		2SC1815(Y)
		2SC1923(O)
		2SC1959(Y)

Item	Re-marks	Name
		2SC2053
		2SC2075
		2SC2240(GR)
		2SC2290*J
		2SC2509
		2SC2538
		2SC2603(E)
		2SC2703(O)
	N	2SC2703(O or Y)
		2SD880(Y)
FET		2SK30A(O)
		2SK125
		2SK192A(GR)
		2SK192(Y)
		3SK73(GR)
		3SK74(L)
IC		74LS90N
	N	AN612
	N	AN6551
	N	AN7805
	N	AN7808
		HD74LS90P
		LM358P

Item	Re-marks	Name
	N	M74LS112AP
	N	M74LS145P
		M74LS196P
	N	M74LS197P
	N	M54459L
	N	M54561P
		MB3614
		MC145156P
	N	MN6147C
		SN74LS90N
		SN74S10N
		SN74S112N
		SN16913P
		TC4011BP
		TC4512BP
		TC5065BP
		TC5067BP
		µPB551C
	N	µPC1158H2
	N	µPC2002V
		µPD5101LC
	N	µPD8049C-279
		µPD8243C

PARTS LIST

TS-430 GENERAL

Part No.	Remarks	Description	Ref. No.
A01-0935-02	N	Case (A) upper	
A01-0936-02	N	Case (B) lower	
A20-2457-13	N	Panel	
B05-0708-04		SP grill cloth	
B30-0817-15		Pilot lamp 14V, 80mA	
B31-0639-05	N	Meter	
B39-0407-04		Spacer x 2 Assistant foot	
B42-1767-04	N	VOX name plate Case (A)	
B42-1768-04	N	Switch plate	
B43-0683-14	N	Name plate **K,M,W**	
B43-0684-04	N	Name plate **T**	
B46-0410-10		Warranty card **K**	
B50-4006-10	N	Instruction manual **K,M**	
B50-4007-00	N	Instruction manual **T**	
B50-4130-00	N	Instruction manual **W**	
CE04W1A470M		E 47 10V Encoder ass'y	C1
CK45E2H222P		C 0.0022 500V	C3
CK45F1H103Z		C 0.01	C2,4–8
CK45F1H473Z		C 0.047	C1
D09-0306-04	N	Slit plate Moving	
D09-0307-04	N	Slit plate Fixed	
D40-0626-15	N	Detector mech. ass'y	
E04-0152-05		UHF type receptacle ANT	
E06-0751-05		7P DIN socket REMOTE	
E06-0851-05		8P DIN socket X.VERTOR, W SW	
E06-0852-05		8P DIN socket ACC,W/O SW	
E07-0751-05		7P DIN plug Accessory	
E07-0851-05		8P DIN plug Accessory	
E08-0671-05		6P square socket	
E11-0403-05		Phone jack EXT.SP	
E11-0404-05		3P phone jack KEY	
E11-0412-05		3P phone jack PHONE	
E12-0001-15		Phone plug Accessory	
E20-0315-05		Mold terminal 3P	
E23-0417-05		Pressure weld terminal x 2	
E29-0407-05		Bridge connector	
E30-1637-05		4 cores cable	
E30-1638-05		DC cord Accessory	
E31-0431-15		Speaker cord	
E31-2154-05	N	CAL cord Accessory	
F05-2034-05		Fuse 20A	
F15-0641-04	N	Switch mask Case (A)	
G02-0505-05		Knob fixed spring x 4	
G13-0665-04	N	Cushion MODE	
G13-0666-04	N	Cushion x 2 Panel	
G13-0668-04	N	Cushion VOX	
G53-0515-04		Packing (B) x 2	
H01-4543-04	N	Packing carton (inside)	
H03-2083-04	N	Packing carton (outside)	
H10-2565-02	N	Packing fixture (F)	
H10-2566-02	N	Packing fixture (R)	
H12-1315-04	N	Cushion	
H20-1410-03		Protective cover	
H25-0079-04		Protective bag MIC **M**	
H25-0112-04		Protective bag Cord	
H25-0116-04		Protective bag	
J02-0323-05		Foot x 4	
J02-0403-04		Rubber foot x 4	
J02-0407-04		Assistant foot	
J13-0404-05		Fuse holder	
J21-2573-04		Foot mounting hardware x 2	
J31-0141-04		Spacer ring MIC	
J61-0019-05		Vinyle tie x 10	
J61-0408-05		Nylon band x 27	
K01-0410-05	N	Carring handle	
K21-0768-04	N	Main knob	
K23-0710-04		Knob (inside) x 4 AF,MIC,NOTCH,RIT	
K23-0753-04		Pointer knob x 2 FUNCTION,M.CH	
K27-0426-14		BAND knob x 2 BAND	
K29-0741-24		Knob (outside) x 4 RF,CAR,SQL, IF SHIFT	
K29-0758-04		Push knob POWER	
K29-0767-04	N	Push knob x 4 1MHz STEP, NB, ATT,NOTCH	
K29-0768-04	N	Push knob RIT	
K29-0769-04	N	Push knob MODE(LSB,USB, CW,AM,FM)	
K29-0770-04	N	Push knob A=B,LOCK,STEP, M.CH,MR,M.IN,MS,PG.S,HOLD	
K29-0771-04	N	Knob ring Main knob	
N09-0256-05		GND screw x 4 Sub, rear panel	
N09-0646-04	N	Round screw x 2	
N10-2030-46		Nut x 2 Mold terminal	
N14-0115-05		Flange nut GND	
N14-0509-05		Wing nut GND	
N15-1040-46		Flat washer x 2 GND	
N16-0030-46		Spring washer	
N30-2004-46		Round screw x 5	
N30-2604-46		Round screw x 17	
N30-3008-46		Round screw x 2 Mold terminal	
N30-4016-46		Round screw GND	
N32-2604-46		Flat screw x 9	
N32-2606-46		Flat screw x 8	
N32-3006-46		Flat screw x 5	
N33-3006-41		Round flat screw x 4 SP	
N33-3006-45		Round flat screw x 4 Panel	
N35-3006-41		Bind screw x 16 Case (A),(B)	
N35-3006-46		Bind screw x 16 Panel	
N87-2606-46		Self tapping screw x 2 VFO A,B	
N87-3006-41		Self tapping screw x 6	
N87-3006-46		Self tapping screw x 8	
N87-3012-46		Self tapping screw x 33	
N88-3006-46		Flat tepping screw x 16	
N89-3006-45		Bind tapping screw x 4 Final	
R12-2411-06		Trim. pot. 5kΩ(B) x 2 Encoder ass'y	VR1,2
RS14AB3A100J		MF 10Ω 1W	R5
RS14AB3D472J		MF 4.7kΩ 2W	R6
R92-0662-05	N	Cement 10mΩ 5W	R1
S40-2437-05		Push switch POWER	S1

PARTS LIST

Part No.	Re-marks	Description	Ref. No.
T03-0027-15		Speaker	
T91-0352-05		Microphone Accessory M	
W02-0328-10	N	Encoder ass'y	
W09-0326-05		Lithium battery CR2032	
X41-1470-00	N	Switch unit	
X44-1510-11	N	RF unit	
X45-1280-00	N	Final unit	
X48-1370-00	N	IF unit	
X50-1910-00	N	PLL unit	
X51-1290-00	N	Filter unit	
X53-1290-00	N	Control unit	
X54-1710-00	N	Display unit	

SWITCH UNIT (X41-1470-00)

Part No.	Re-marks	Description	Ref. No.	Q'ty
CE04W1C222M		E 2200 16V	C2,3	2
CK45B1H102K		C 0.001	C10,11	2
CK45F1H103Z		C 0.01	C5,6	2
CK45F1H473Z		C 0.047	C1,4	2
C91-0456-05		C 0.047	C7,8,12	3
E06-0853-05		8P metal socket MIC		1
E08-0272-05	N	Mini connector 2P		1
E08-0373-05	N	Mini connector 3P		1
E23-0401-05		Round terminal		1
E40-0273-05		Mini connector 2P		5
E40-0473-05		Mini connector 4P		1
E40-0573-05		Mini connector 5P		1
E40-0673-05		Mini connector 6P		4
L15-0016-05		Choke coil	CH1	1
N10-2030-46		Nut		2
N30-3008-46		Round screw 3 x 8		2
R12-4410-05		Trim. pot. 50kΩ	VR1	1
R13-1401-05	N	Pot. 1kΩ(B) ANTI VOX	VR8	1
R13-4401-05	N	Pot. 50kΩ(B) VOX GAIN	VR6	1
R13-6401-05	N	Pot. 250kΩ(B) DELAY, SCAN	VR7,9	2
R19-3415-05	N	Pot. 10kΩ(A) x 2 MIC/CAR	VR4	1
R19-3416-05	N	Pot. 10kΩ(B), 10kΩ(F) AF/RF	VR2	1
R19-3417-05	N	Pot. 10kΩ(B), 10kΩ(F) RIT/SHIFT	VR3	1
R24-9403-15	N	Pot. 250kΩ/10kΩ(B) 50kΩ(B) NOTCH/SQL	VR5	1
S29-1427-05	N	Rotary switch FUNCTION	S2	1
S29-1428-05	N	Rotary switch M.CH	S1	1
S36-2408-05	N	Paddle switch SEND/REC, VOX/MAN	S14,15	2
S36-2411-05	N	Paddle switch PROC, ALC/IC, MAR/WIDE	S16–18	3
S40-2440-15	N	Push switch LOCK, STEP, M.CH,MS, PG.S, HOLD, 1MHz STEP, RIT NB, ATT, NOTCH	S6–8,11–13, 19–23	11
S40-2441-15	N	Push switch A=B, MR, M.IN	S5,9,10	3
S50-1409-05		Tact switch BAND	S3,4	2
S50-1411-05		Tact switch MODE	S24–28	5

RF UNIT (X44-1510-11)

Part No.	Re-marks	Description	Ref. No.	Q'ty
CC45RH1H010C		C 1P	C141	1
CC45RH1H030C		C 3P	C144,200	2
CC45RH1H050C		C 5P	C93,145	2
CC45RH1H070D		C 7P	C138,140	2
CC45RH1H100D		C 10P	C80,90,134,143	4
CC45RH1H101J		C 100P	C73	1
CC45RH1H270J		C 27P	C101	1
CC45RH1H330J		C 33P	C158	1
CC45RH1H560J		C 56P	C77,78	2
CC45SL1H030C		C 3P	C122	1
CC45SL1H050C		C 5P	C152,159	2
CC45SL1H070D		C 7P	C154	1
CC45SL1H101J		C 100P	C70,71,104,110	4
CC45SL1H121J		C 120P	C58,166,186	3
CC45SL1H151J		C 150P	C59	1
CC45SL1H180J		C 18P	C199	1
CC45SL1H181J		C 180P	C53	1
CC45SL1H221J		C 220P	C46	1
CC45SL1H271J		C 270P	C48,54	2
CC45SL1H330J		C 33P	C72,79	2
CC45SL1H390J		C 39P	C3	1
CC45SL1H470J		C 47P	C2,106,107, 157	4
CC45SL1H560J		C 56P	C63,189	2
CC45SL1H680J		C 68P	C1,64	2
CC45SL1H820J		C 82P	C190	1
CE04W1A101M		E 100 10V	C180	1
CE04W1A220M		E 22 10V	C84	1
CE04W1A470M		E 47 10V	C178,179	2
CE04W1C100M		E 10 16V	C108	1
CE04W1H010M		E 1 50V	C15,23,29,34,37, 45,50,55,60,66, 129,165,177,191	14
CE04W1H3R3M		E 3.3 50V	C173,182	2
CE04W1H4R7M		E 4.7 50V	C174	1
CE04W1HR47M		E 0.47 50V	C108,170	2
CK45B1H102K		C 0.001	C85,92,98–100, 114,116,124,155	9
CK45B1H122K		C 0.0012	C8,26	2
CK45B1H152K		C 0.0015	C18,20,25	3
CK45B1H222K		C 0.0022	C24	1
CK45B1H391K		C 390P	C40,41	2
CK45B1H471K		C 470P	C36,42,47,49	4
CK45B1H561K		C 560P	C125	1
CK45B1H681K		C 680P	C30,31,35	3

PARTS LIST

Part No.	Re-marks	Description	Ref. No.	Q'ty
CK45F1H103Z		C 0.01	C5,61,65,81–83, 87,91,96,97,103, 105,109,111,113, 115,117,120,127, 128,133,135,147, 153,160–162,169, 175,183,184,187, 188,192,202	35
CK45F1H223Z		C 0.022	C14,22,28,32,38, 43,51,56,88,89, 95,112,118,119, 121,123,126,132, 136,137,139,156, 163,164,168,195 196	27
CQ92M1H103K		ML 0.01	C176	1
CQ92M1H223K		ML 0.022	C181	1
CQ92M1H472K		ML 0.0047	C171	1
CQ92M1H473K		ML 0.047	C172	1
C90-0838-05		E 1 50V	C193	1
C91-0105-05		C 0.0047	C7,10,13,74,75	5
C91-0125-05		C 0.0027	C6,19	2
C91-0131-05		C 0.01	C146,148–150	4
C91-0132-05		C 0.01	C11,12,16,17	4
C91-0456-05		C 0.047	C4,9,21,27,33, 39,44,52,57,62, 67–69,86,102, 130,131,151,185, 194,197,201	22
C91-0498-05		C 0.35P	C142	1
E04-0157-05		Mini pin jack A		3
E23-0512-05		Terminal		1
E40-0273-05		Mini connector 2P		8
E40-0373-05		Mini connector 3P		2
E40-0473-05		Mini connector 4P		1
E40-0573-05		Mini connector 5P		3
E40-0673-05		Mini connector 6P		2
E40-0773-05		Mini connector 7P		1
J31-0502-04		PC board collar		6
J42-0428-05		PC board bushing		6
L19-0324-05		Wide bandwidth transf.	T3,23	2
L19-0328-05		Wide bandwidth transf.	T24	1
L19-0344-05		Wide bandwidth transf.	T2	1
L30-0506-05		Tuning coil	T11	1
L30-0511-05		Tuning coil 8.83MHz	T14	1
L34-0535-05		Tuning coil	T15	1
L34-0536-05		Tuning coil	T16	1
L34-0697-05		Tuning coil	T18	1
L34-0857-05		Tuning coil	T7	1
L34-0858-05		Tuning coil	T22	1
L34-0859-05		Tuning coil	T5,21	2
L34-0860-15		Tuning coil	T20	1
L34-0862-05		Tuning coil	T17	1
L34-0942-05		Tuning coil	T13	1
L34-2159-05		Tuning coil	T12	1
L34-2142-05	N	Tuning coil	T4,10	2
L34-2143-05	N	Tuning coil	T1	1
L34-2144-05	N	Tuning coil	T8	1
L34-2145-05	N	Tuning coil	T6	1

Part No.	Re-marks	Description	Ref. No.	Q'ty
L34-2146-05	N	Tuning coil	T19	1
L40-1001-02		Ferri-inductor 10µH	L6–8	3
L40-1001-14		Ferri-inductor 10µH	L15,17,41,65,66	5
L40-1011-03		Ferri-inductor 100µH	L48,53	2
L40-1011-14		Ferri-inductor 100µH	L67	1
L40-1021-03		Ferri-inductor 1mH	L3,44	2
L40-1092-14		Ferri-inductor 1µH	L28	1
L40-1292-14		Ferri-inductor 1.2µH	L31,33	2
L40-1501-03		Ferri-inductor 15µH	L47	1
L40-1511-03		Ferri-inductor 150µH	L68	1
L40-1511-13		Ferri-inductor 150µH	L63	1
L40-1511-14		Ferri-inductor 150µH	L5,50,51,55,64	5
L40-1592-14		Ferri-inductor 1.5µH	L25	1
L40-1892-01		Ferri-inductor 1.8µH	L54	1
L40-1892-14		Ferri-inductor 1.8µH	L27,29	2
L40-2201-14		Ferri-inductor 22µH	L11	1
L40-2211-14		Ferri-inductor 220µH	L4,45	2
L40-2282-01		Ferri-inductor 0.22µH	L2	1
L40-2282-14		Ferri-inductor 0.22µH	L42	1
L40-2292-14		Ferri-inductor 2.2µH	L19,24,26	3
L40-2701-14		Ferri-inductor 27µH	L10,12	2
L40-3301-14		Ferri-inductor 33µH	L62	1
L40-3382-01		Ferri-inductor 0.33µH	L1,46,56	3
L40-3382-14		Ferri-inductor 0.33µH	L38	1
L40-3391-14		Ferri-inductor 3.3µH	L18,60	2
L40-3982-14		Ferri-inductor 0.39µH	L35,36,39,40,43	5
L40-3991-14		Ferri-inductor 3.9µH	L21,22	2
L40-4701-03		Ferri-inductor 47µH	L49,52,57	3
L40-4701-13		Ferri-inductor 47µH	L59	1
L40-4701-14		Ferri-inductor 47µH	L13,14,61	3
L40-4791-14		Ferri-inductor 4.7µH	L23	1
L40-5682-14		Ferri-inductor 0.56µH	L37	1
L40-5691-14		Ferri-inductor 5.6µH	L20	1
L40-6811-03		Ferri-inductor 680µH	L9	1
L40-6882-14		Ferri-inductor 0.68µH	L30,32	2
L40-8282-14		Ferri-inductor 0.82µH	L34	1
L40-8291-14		Ferri-inductor 8.2µH	L16	1
L71-0214-05		MCF 48.055MHz	XF	1
L92-0110-05		Ferrite-bead	L70,71	2
R12-1412-05		Trim. pot. 1kΩ	VR1–4	4
R12-3428-05		Trim. pot. 47kΩ	VR5	1
R90-0517-05		Resistor block 4.7kΩ x 7	RB1	1
S51-1404-05		Relay G2E	RL1	1

100W FINAL UNIT (X45-1280-00)

Part No.	Re-marks	Description	Ref. No.	Q'ty
CC45CH1H220J		C 22P	C5	1
CC45SL2H220J		C 22P 500V	C29	1
CC45SL2H101J		C 100P 500V	C10	1
CC45SL2H271J		C 270P 500V	C34,35	2
CE04W1C100M		E 10 16V	C17,22	2
CE04W1E101M		E 100 25V	C19,23	2
CK45B1H102K		C 0.001	C21	1
CK45B1H103K		C 0.01	C13,14,26,27	4

PARTS LIST

Part No.	Re-marks	Description	Ref. No.	Q'ty
CK45B1H471K		C 470P	C1	1
CK45F1H103Z		C 0.01	C33	1
CK45F1H473Z		C 0.047	C6,7,28	3
CM73F2H122J		Laminated cap. 0.0012 500V	C15	1
CM93D2H561J		MC 560P 500V	C30	1
C91-0456-05		C 0.047	C2–4,8,9,16, 18,20,24,25,31,32	12
C91-1004-05	N	Chip cap. 0.0068 50V	C11,12	2
E23-0401-05		Round terminal		1
E40-0273-05		Mini connector 2P		1
E40-0275-05		Pin connector 2P		1
E40-0373-05		Mini connector 3P		1
F01-0785-05	N	Heat sink		1
F07-0846-03	N	Heat sink cover		1
F09-0405-14		Fan		1
F20-0078-05		Insulating sheet		3
F29-0014-05		Shoulder washer		7
F29-0406-03		Fan motor ass'y		1
L19-0338-05		Input matching transf.	T1	1
L19-0342-05	N	Drive transf.	T2	1
L19-0343-05	N	Final transf.	T3	1
L33-0617-05		Choke coil	L11	1
L33-0651-05		Choke coil	L5–10	6
L33-0652-05		Choke coil 0.7μH	L1	1
L40-1011-03		Ferri-inductor 100μH	L12	1
L40-1021-03		Ferri-inductor 1mH	L3,4	2
L40-1511-03		Ferri-inductor 150μH	L2	1
N15-1030-46		Washer		4
N30-2604-46		Round screw 2.6 x 4		5
N30-3006-46		Round screw 3 x 6		3
N30-3008-46		Round screw 3 x 8		4
N35-3006-45		Bind screw 3 x 6		4
N87-3006-46		Self tapping screw 3 x 6		8
N89-3006-45		Bind tapping screw 3 x 6		6
R12-1406-05		Trim. pot. 1kΩ (B)	VR1,2	2
RC05GF2H150J		Solid 15Ω 1/2W	R15,16	2
RC05GF2H221J		Solid 220Ω 1/2W	R8,11	2
RC05GF2H3R9J		Solid 3.9Ω 1/2W	R6	1
RS14AB3D150J		MF 15Ω 2W	R23	1
RS14GB3D2R2J		MF 2.2Ω 2W	R12,13	2
RS14GB3F390J		MF 39Ω 3W	R14,17	2
R92-0150-05		Short jumper		9
T42-0301-05		Fan motor		1

IF UNIT (X48-1370-00)

Part No.	Re-marks	Description	Ref. No.	Q'ty
C05-0309-05		Ceramic trimmer 40P	TC1	1
CC45SL1H050C		C 5P	C142	1
CC45SL1H100D		C 10P	C30	1
CC45SL1H101J		C 100P	C32,91,94	3
CC45SL1H150J		C 15P	C165,166	2
CC45SL1H221J		C 220P	C64,153	2
CC45UJ1H470J		C 47P	C63,65,125,137, 149	5
CC45UJ1H330J		C 33P	C34	1
CE04BW1HR22M		E 0.22 50V	C55	1
CE04BW1HR47M		E 0.47 50V	C99	1
CE04W0J470M		E 47 6.3V	C121	1
CE04W1A101M		E 100 10V	C47,147	2
CE04W1A221M		E 220 10V	C98	1
CE04W1A470M		E 47 10V	C39,56,116,150, 151,158	6
CE04W1C100M		E 10 16V	C81,101	2
CE04W1C220M		E 22 16V	C112	1
CE04W1H0R1M		E 0.1 50V	C57	1
CE04W1H010M		E 1 50V	C44,50,62,68, 70,72,93,100, 102,103,105,111, 118–120,135,146	17
CE04W1H100M		E 10 50V	C53,97	2
CE04W1HR22M		E 0.22 50V	C58,164	2
CE04W1HR47M		E 0.47 50V	C41,48,54,59, 106	5
CE04W1H4R7M		E 4.7 50V	C40,43,104	3
CK45B1H102K		C 0.001	C14,21,26,33, 130,148	6
CK45B1H471K		C 470P	C127	1
CK45F1H103Z		C 0.01	C2,3,12,25,36, 38,61,69,71,76, 82,123,126,128, 136,138,144,145, 156,157,160	21
CK45F1H223Z		C 0.022	C1,4–11,13, 16–20,23,24, 28,29,31,66,73, 107,139–141	26
CQ92M1H102K		ML 0.001	C52,122	2
CQ02M1H103K		ML 0.01	C108,109	2
CQ92M1H104K		ML 0.1	C77,90	2
CQ92M1H123K		ML 0.012	C86–89	4
CQ92M1H153K		ML 0.015	C96	1
CQ92M1H222K		ML 0.0022	C37	1
CQ92M1H223K		ML 0.022	C110	1
CQ92M1H333K		ML 0.033	C42,46	2
CQ92M1H392K		ML 0.0039	C51	1
CQ92M1H472K		ML 0.0047	C80	1
CQ92M1H473K		ML 0.047	C74,83,85,95	4
CQ92M1H822K		ML 0.0082	C154	1
CS16E1ER47M		T 0.47 25V	C161	1
CS15E1VR22M		T 0.22 35V	C159	1
C90-0838-05		E 1 50V	C49,67	2
C90-0840-05		E 10 10V	C60,84	2
C90-0847-05		E 47 10V	C92,152	2
C90-0848-05		E 47 16V	C115	1
C90-0864-05	N	E 220 10V	C75	1
C90-0866-05		E 470 6.3V	C79	1
C91-0119-05		C 0.047	C15,22,27,45,78, 113,114,117,124	9
C91-1008-05		C 0.022	C162,163	2

PARTS LIST

Part No.	Re-marks	Description	Ref. No.	Q'ty
E23-0512-05		Terminal		2
E29-0413-05		1P connector (female)		1
E40-0273-05		Mini connector 2P		13
E40-0373-05		Mini connector 3P		2
E40-0473-05		Mini connector 4P		4
E40-0573-05		Mini connector 5P		3
E40-0673-05		Mini connector 6P		3
E40-0773-05		Mini connector 7P		1
E40-0873-05		Mini connector 8P		1
F20-0516-05		Insulating sheel		1
F29-0014-05		Shoulder washer		1
J31-0502-04		PC board collar		7
J42-0428-05		PC board bushing		7
L34-0535-05		Tuning coil	L3,9	2
L34-0536-06		Tuning coil	L4	1
L34-0708-05		Tuning coil	L1	1
L34-2077-05		Tuning coil	L2	1
L40-1011-14		Ferri-inductor 100μH	L14,15	2
L40-1021-03		Ferri-inductor 1mH	L5	1
L40-1511-03		Ferri-inductor 150μH	L10,11	2
L40-3391-03		Ferri-inductor 3.3μH	L6	1
L40-4711-03		Ferri-inductor 470μH	L13	1
L40-1511-13		Ferri-inductor 150μH	L16	1
L71-0208-05		MCF YK-88S	XF1	1
N09-0641-05		Screw		4
N30-3006-46		Round screw 3 x 6		4
R12-1408-05		Trim. pot. 4.7kΩ	VR4,5,9	3
R12-1412-05		Trim. pot. 1kΩ	VR1	1
R12-3427-05		Trim. pot. 10kΩ	VR2,8,12	3
R12-3428-05		Trim. pot. 47kΩ	VR6,7,10	3
R12-6405-05	N	Trim. pot. 470kΩ	VR3,11	2
R90-0559-05	N	Inline block	IB1,3–7	6
R92-0150-05		Short jumper		51

PLL UNIT (X50-1910-00)

Part No.	Re-marks	Description	Ref. No.	Q'ty
CC45CH1H050C		C 5P	C10,14,18,24,34,66	6
CC45CH1H120J		C 12P	C67	1
CC45CH1H180J		C 18P	C32	1
CC45CH1H270J		C 27P	C42	1
CC45CH1H330J		C 33P	C13,19,25,38,43	5
CC45RH1H050C		C 5P	C86	1
CC45RH1H070D		C 7P	C89	1
CC34RH1H080D		C 8P	C85,87	2
CC34RH1H100D		C 10P	C84,88	2
CC45RH1H560J		C 56P	C17	1
CC45RH1H680J		C 68P	C9	1
CC45SH1H470J		C 47P	C23	1
CC45SL1H101J		C 100P	C59	1
CC45SL1H151J		C 150P	C41	1
CC45SL1H680J		C 68P	C83	1
CC45SL1H221J		C 220P	C100	1
CC45TH1H050C		C 5P	C29	1
CC45TH1H330J		C 33P	C30	1
CC45TH1H390J		C 39P	C28	1
CE04W1A101M		E 100 10V	C44	1
CE04W1A470M		E 47 10V	C8,11,15,21,27,49,55	7
CE04W1V100M		E 10μ 16V	C78	1
CK45B1H102K		C 0.001	C77,91–93,101	5
CK45B1H222K		C 0.0022	C5	1
CK45F1H103Z		C 0.01	C1–4,12,16,22,26,33,36,54,57,62,69–74,79,82,90,97,98	24
CK45F1H223Z		C 0.022	C94–96	3
CQ92M1H102K		ML 0.001	C47	1
CQ92M1H104K		ML 0.1	C46	1
C91-0119-05		C 0.047 (SR)	C37,39,48,52,65	5
C91-0131-05		C 0.01	C6	1
C91-0456-05		C 0.047	C7,31,35,40,45,50,51,53,58,60,63,64,68,75,81,99,102	17
E04-0157-04		Mini pin jack A		1
E23-0046-04		Square terminal		2
E40-0273-05		Mini connector 2P		2
E40-0473-05		Mini connector 4P		2
E40-0673-05		Mini connector 6P		1
J31-0502-04		PC board collar		6
J42-0428-05		PC board bushing		6
L19-0344-05	N	Wide bandwidth transf.	T5	1
L34-0851-05		Tuning coil	T6,9	2
L34-0852-05		Tuning coil	T1	1
L34-0853-05		Tuning coil	T2	1
L34-0854-05		Tuning coil	T3	1
L34-0855-05		Tuning coil	T4	1
L34-0856-05		Tuning coil	T7,8	2
L40-1011-03		Ferri-inductor 100μH	L23,27	2
L40-1011-14		Ferri-inductor 100μH	L32	1
L40-1511-03		Ferri-inductor 150μH	L9,11,20,21,25	5
L40-2282-01		Ferri-inductor 0.22μH	L15	1
L40-3301-03		Ferri-inductor 33μH	L22	1
L40-3382-01		Ferri-inductor 0.33μH	L14,16,17	1
L40-4701-03		Ferri-inductor 47μH	L5–8,26,30,31	7
L40-4711-03		Ferri-inductor 470μH	L10,18,19,24,28,29	6
L40-4711-13		Ferri-inductor 470μH	L13,33	2
L40-4782-02		Ferri-inductor 0.47μH	L12	1
R92-0150-05		Short jumper		12

PARTS LIST

FILTER UNIT (X51-1290-00)

Part No.	Re marks	Description	Ref. No.	Q'ty
C05-0043-05		Ceramic trimmer 20P	TC1	1
CC45SL2H030C		C 3P 500V	C82	1
CC45SL2H100D		C 10P 500V	C65,72	2
CC45SL2H101J		C 100P 500V	C35,60	2
CC45SL2H120J		C 12P 500V	C14	1
CC45SL2H121J		C 120P 500V	C38,51,40	3
CC45SL2H180J		C 18P 500V	C46	1
CC45SL2H151J		C 150P 500V	C4,7	2
CC45SL2H181J		C 180P 500V	C3,18,24,34,57, 68	6
CC45SL2H221J		C 220P 500V	C15,26,39,47,79	5
CC45SL2H271J		C 270P 500V	C21	1
CC45SL2H330J		C 33P 500V	C37,52	2
CC45SL2H391J		C 390P 500V	C12,29,36	3
CC45SL2H470J		C 47P 500V	C23,48,55,61	4
CC45SL2H471J		C 470P 500V	C6,8,17,25	4
CC45SL2H560J		C 56P 500V	C13,45,64,71	4
CC45SL2H680J		C 68P 500V	C28,43,58,81	4
CC45SL2H681J		C 680P 500V	C9	1
CC45SL2H820J		C 82P 500V	C98,106	2
CE04W1C100M		E 10 16V	C84	1
CE04W1H010M		E 1 50V	C88	1
CE04W1HR47M		E 0.47 50V	C86	1
CK45F1H103Z		C 0.01	C1,74,75,77,78, 83,87,93,94,99, 102–104	13
CK45F1H473Z		C 0.047	C19,31,32,41,42, 53,54,62,73,76, 80,85,105	13
CM93D2H102J		MC 0.001	C16	1
CM93D2H182J		MC 0.0018	C5	1
CM93D2H821J		MC 820P	C95	1
C91-0119-05		C 0.047 (SR)	C2,10,11,20,63, 89–92,101	10
E04-0154-04		Coax. connector		1
E04-0157-04		Mini pin jack		1
E23-0512-04		Square terminal		2
E29-0413-05		1P connector (female)		1
E40-0273-05		Mini connector 2P		4
E40-0373-05		Mini connector 3P		3
E40-0473-05		Mini connector 4P		2
E40-0673-05		Mini connector 6P		1
J31-0502-04		PC board collar		6
J42-0428-05		PC board bushing		6
L33-0672-05		Ferri-inductor 100μH	L21–36	16
L34-3038-05		LPF coil A 1.5–2.5	L1	1
L34-3039-05		LPF coil B 1.5–2.5	L2	1
L34-3054-05	N	LPF coil E 4–6.5	L5	1
L34-3055-05	N	LPF coil F 4–6.5	L6	1
L34-3056-05	N	LPF coil G 6.5–10.5	L7	1
L34-3057-05	N	LPF coil H 6.5–10.5	L8	1
L34-3058-05	N	LPF coil J 10.5–16	L9	1
L34-3059-05	N	LPF coil K 10.5–16	L10	1
L34-3060-05	N	LPF coil L 16–23	L11,12	2
L34-3062-05	N	LPF coil N 23–30	L13,14	2
L34-3081-05	N	LPF coil C 2.5–4	L3	1
L34-3082-05	N	LPF coil D 2.5–4	L4	1
L39-0406-05		Detector coil	T1	1
L40-1011-13		Ferri-inductor 100μH	L4	1
L40-1011-14		Ferri-inductor 100μH	L37–40	4
L40-1021-03		Ferri-inductor 1mH	L15–17	3
L40-1511-03		Ferri-inductor 150μH	L18,19	2
R12-0427-05		Trim. pot. 500Ω	VR5	1
R12-2410-05		Trim. pot. 5kΩ	VR4	1
R12-3434-05		Trim. pot. 10kΩ	VR3	1
R12-4411-05		Trim. pot. 50kΩ	VR1,2	2
RC05GF2H181J		Solid 180Ω 1/2W	R40	1
R92-0150-05		Short jumper		20
S51-1404-05		Relay G2E	RL2–15	14
S51-2407-05		Relay FBR321	RL1	1

CONTROL UNIT (X53-1290-00)

Part No.	Re marks	Description	Ref. No.	Q'ty
C05-0035-05		Ceramic trimmer 50P	TC1	1
C05-0067-05		Ceramic trimmer 25P	TC5,6	2
C05-0309-05		Ceramic trimmer 40P	TC2–4	3
CC45CH1H0R5C		C 0.5P	C47	1
CC45CH1H020C		C 2P	C31,116,135	3
CC45CH1H150J		C 15P	C3,30,33,36,178, 179	6
CC45CH1H220J		C 22P	C136	1
CC45CH1H560J		C 56P	C29,38	2
CC45RH1H030C		C 3P	C58	1
CC45RH1H050C		C 5P	C67	1
CC45RH1H070D		C 7P	C57	1
CC45RH1H100D		C 10P	C56	1
CC45RH1H120J		C 12P	C6,66,68	3
CC45RH1H220J		C 22P	C16,18,55,124	4
CC45RH1H270J		C 27P	C127	1
CC45RH1H560J		C 56P	C115,117	2
CC45RH1H820J		C 82P	C100	1
CC45SL1H030C		C 3P	C144	1
CC45SL1H050C		C 5P	C40,42,85,144	4
CC45SL1H100D		C 10P	C32,86,110	3
CC45SL1H101J		C 100P	C12,41,92,94, 114,133,143	7
CC45SL1H120J		C 12P	C84	1
CC45SL1H150J		C 15P	C43,112	2
CC45SL1H151J		C 150P	C140	1
CC45SL1H221J		C 220P	C93,107	2
CC45SL1H270J		C 27P	C24,26	2
CC45SL1H470J		C 47P	C211	1
CC45SL1H560J		C 56P	C25	1
CC45SL1H680J		C 68P	C108	1
CC45TH1H120J		C 12P	C6	1
CC45TH1H150J		C 15P	C54	1
CC45TH1H270J		C 27P	C53,58	2
CC45UJ1H030C		C 3P	C5,17	2
CC45UJ1H120J		C 12P	C4	1
CC45UJ1H180J		C 18P	C39	1
CC45UJ1H220J		C 22P	C82,106,213	3
CC45UJ1H221J		C 220P	C105	1
CC45UJ1H270J		C 27P	C126	1
CC45UJ1H330J		C 33P	C139	1

PARTS LIST

Part No.	Re-marks	Description	Ref. No.	Q'ty
CE04W1A101M		E 100 10V	C48,79,118,119,175	5
CE04W1A470M		E 47 10V	C75,147,151,163	4
CE04W1H010M		E 1 50V	C148,174	2
CE04W1H3R3M		E 3.3 50V	C150	1
CE04W1HR47M		E 0.47 50V	C129,195,196,149	4
CK45B1H102K		C 0.001	C34,155,158–162,202,205,212	10
CK45B1H222K		C 0.0022.	C52,80	2
CK45B1H471K		C 470P	C132,142	2
CK45F1H103Z		C 0.01	C1,7–11,13–15,19–23,27,35,37,44,45,59–65,69–72,81,87–89,91,95,102,103,104,109,111,113,123,125,128,130,131,134,137,138,141,145,146,165–173,177,180–194,200,201,206,209,210	83
CK45F1H223Z		C 0.022	C197	1
CQ92M1H102K		ML 0.001	C50	1
CQ02M1H104K		ML 0.1	C51	1
CQ92M1H152K		ML 0.0015	C76	1
CQ92M1H683K		ML 0.068	C77	1
CQ92M1H822K		ML 0.0082	C154	1
C91-0131-05		C 0.01	C203	1
C91-0456-05		C 0.047	C2,28,46,49,73,74,78,90,96–99,120,121,122,156,164,176,198,199,204,207,208	23
C91-0457-05		C 0.022	C153,157	2
E04-0157-05		Mini pin jack A		1
E23-0046-04		Square terminal		5
E40-0273-05		Mini connector 2P		8
E40-0274-05		Mini connector 2P		1
E40-0373-05		Mini connector 3P		4
E40-0473-05		Mini connector 4P		8
E40-0573-05		Mini connector 5P		4
E40-0673-05		Mini connector 6P		1
E40-0773-05		Mini connector 7P		2
E40-0873-05		Mini connector 8P		1
J31-0502-04		PC board collar		7
J42-0428-05		PC board bushing		7
L32-0198-05		OSC coil	L10	1
L32-0201-05		OSC coil 8.83MHz	T14	1
L32-0639-05		OSC coil	L18	1
L33-0636-05		Choke coil 28μH	L31	1
L33-0663-05	N	Choke coil 1μH	L12	1
L33-0664-05	N	Choke coil 2.7μH	L22	1
L33-0665-05	N	Choke coil 39μH	L23	1
L34-2140-05	N	Tuning coil 9.67MHz	T10	1
L34-2141-05	N	Tuning coil 9MHz	T12,13	2
L34-3064-05	N	BPF coil 43MHz	T1,3,4,6	4
L34-3065-05	N	BPF coil 43MHz	T2	1
L34-3066-05	N	BPF coil 34MHz	T5	1

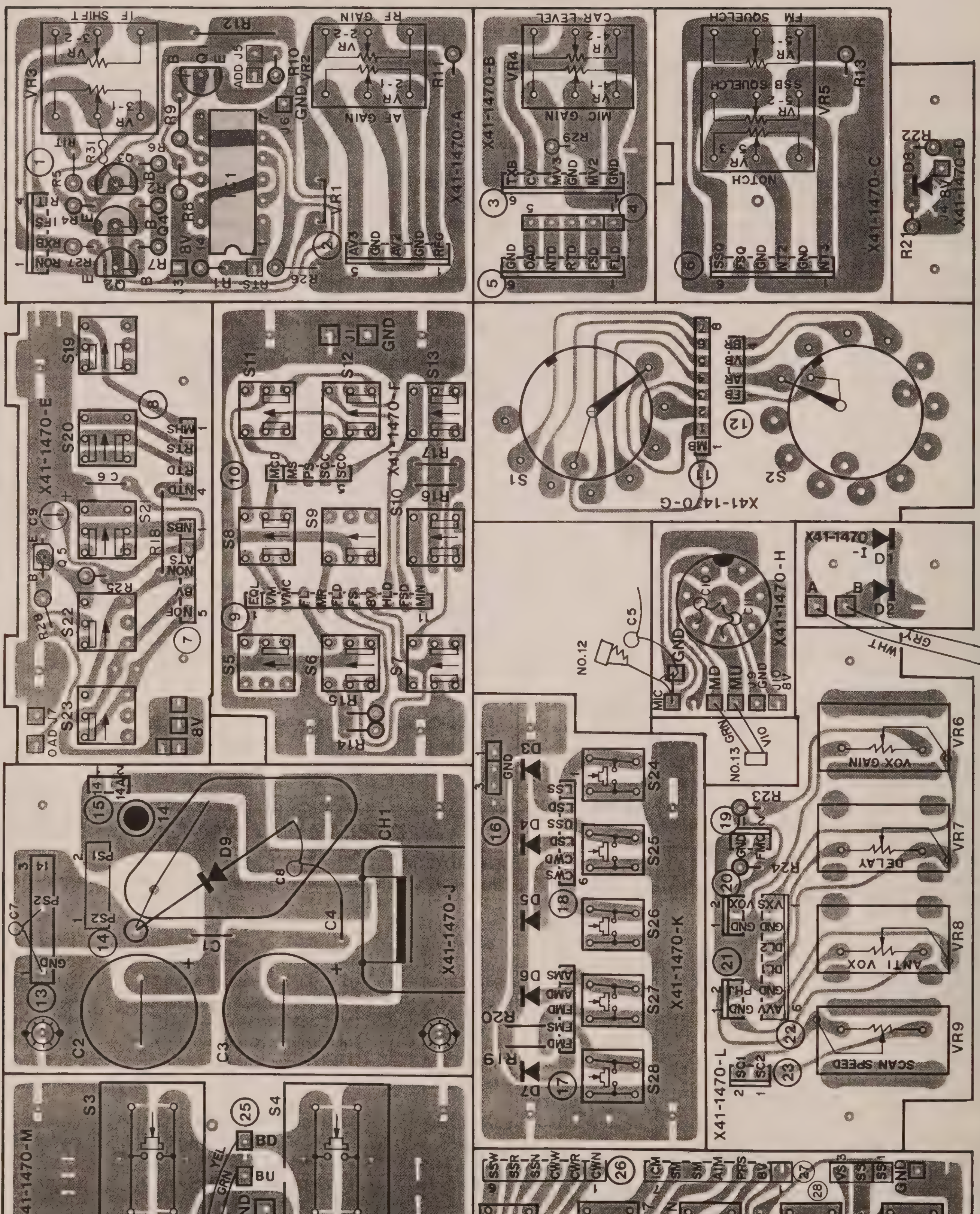
Part No.	Re-marks	Description	Ref. No.	Q'ty
L34-3067-05	N	BPF coil 42.5MHz	T7,9	2
L34-3068-05	N	BPF coil 42.5MHz	T8	1
L40-1011-03		Ferri-inductor 100μH	L1,4–7,11,13–15,17,27,35	12
L33-0672-05		Ferri-inductor 100μH	L36–41	6
L40-1011-04		Ferri-inductor 100μH	L25,26	2
L40-1021-03		Ferri-inductor 1mH	L8,9	2
L40-1511-03		Ferri-inductor 150μH	L34,43	2
L40-2201-03		Ferri-inductor 22μH	L2,3,42	3
L40-2211-03		Ferri-inductor 220μH	L16,19,20,24,30,32,33	7
L40-4711-03		Ferri-inductor 470μH	L21,28,29	3
L72-0336-05	N	Ceramic filter 9.65MHz	CF1	1
L77-0485-05		Crystal 8.8315MHz	X2	1
L77-0486-05		Crystal 8.8285MHz	X1	1
L77-0978-05	N	Crystal 36MHz	X4	1
L77-0979-05	N	Crystal 39.225MHz	X5	1
L77-0980-05	N	Crystal 8.7915MHz	X3	1
L77-0981-05	N	Crystal 9MHz	X6	1
L78-0005-05		Ceramic OSC 5.75MHz	X7	1
R12-1038-05		Trim. pot. 1kΩ	VR1,2	2
R12-1040-05		Trim. pot. 4.7kΩ	VR3	1
R90-0515-05		Resistor block 10kΩ x 4	RB1	1
R90-0561-05	N	Resistor block 22kΩ x 6	RB3	1
R90-0562-05	N	Resistor block 22kΩ x 8	RB2	1
R92-0150-05		Short jumper		94
S31-1005-05		Slide switch	S1	1

DISPLAY UNIT (X54-1710-00)

Part No.	Re-marks	Description	Ref. No.	Q'ty
CE04W0J221M		E 220 6.3V	C2	1
CE04W1A470M		E 47 10V	C1	1
CE04W1V100M		E 10 35V	C3,5–7	4
CQ92M1H103K		ML 0.01	C4	1
C91-0456-05		C 0.047	C8	1
E40-0273-05		Mini connector 2P		1
E40-0473-05		Mini connector 4P		1
E40-0773-05		Mini connector 7P		1
E40-0873-05		Mini connector 8P		1
L19-0305-05		OSC transf.	T1	1
L40-1011-04		Ferri-inductor 100μH	L1	1
L40-1511-03		Ferri-inductor 150μH	L2	1
N30-2604-46		Round screw 2.6 x 4		6
N87-3006-46		Self tapping screw 3 x 6		2
R90-0511-05		Resistor block 47kΩ x 8	RB1	1
R90-0521-05		Resistor block 47kΩ x 7	RB2	1
R92-0150-05		Short jumper		11

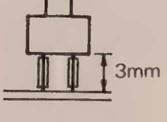
TS-430S PC BOARD VIEW

SWITCH UNIT (X41-1470-00) **Component side view**

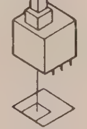


Q1–4 : 2SC945(R) Q5 : 2SC1815(Y)
D1,2,6–8 : SY438D D3–5 : SG238D D9 : S31C(S)
IC1 : TC4011BP

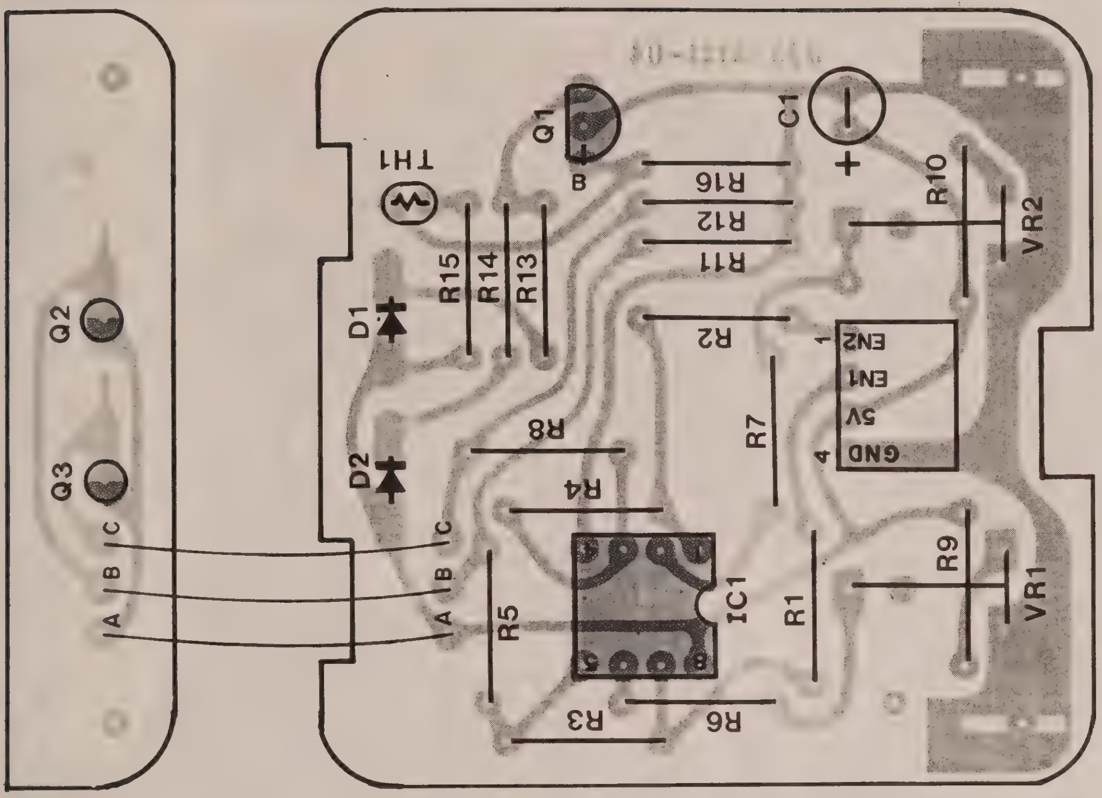
<Attachment method of D1–8>



<Attachment direction of S5–13,19–23>

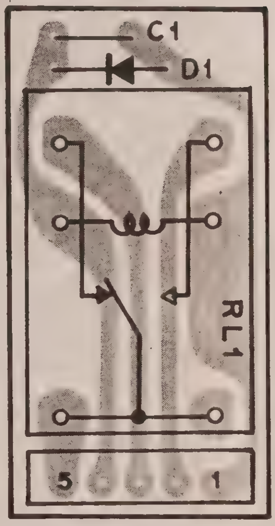


ENCODER ASS'Y (J25-3141-04) Component side view



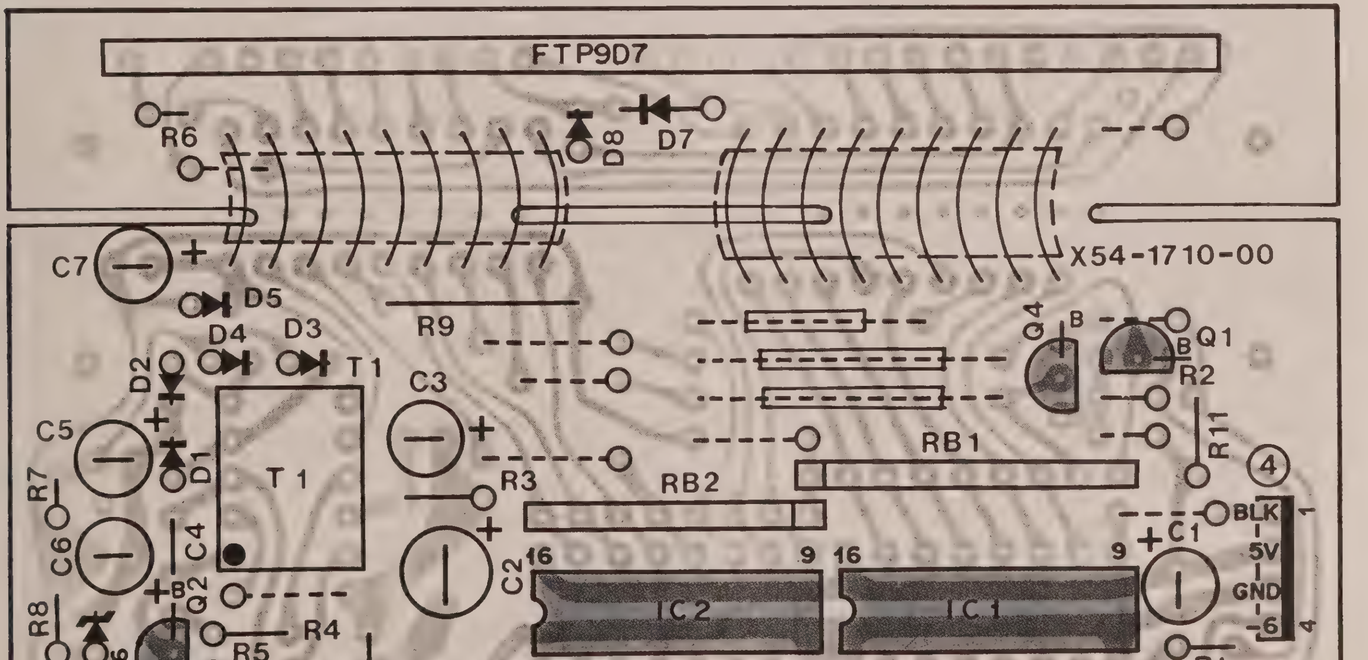
Q1 : 2SA1015(Y) Q2,3 : PN126S
D1,2 : LN66(R)
IC1: LM358P

RELAY BOARD
Component side view



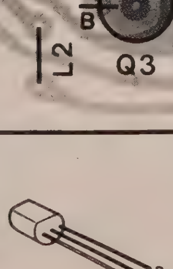
D1 : 1S1555

DISPLAY UNIT (X54-1710-00) Component side view

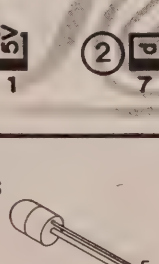


Q1,4 : 2SA1015(Y) Q2,3 : 2SC1959(Y)
D1–4,7,8 : 1S1555 D5 : RD9.1EB2 D6 : RD6.2EB2

2SC945
2SC1015
2SC1815
2SC1959

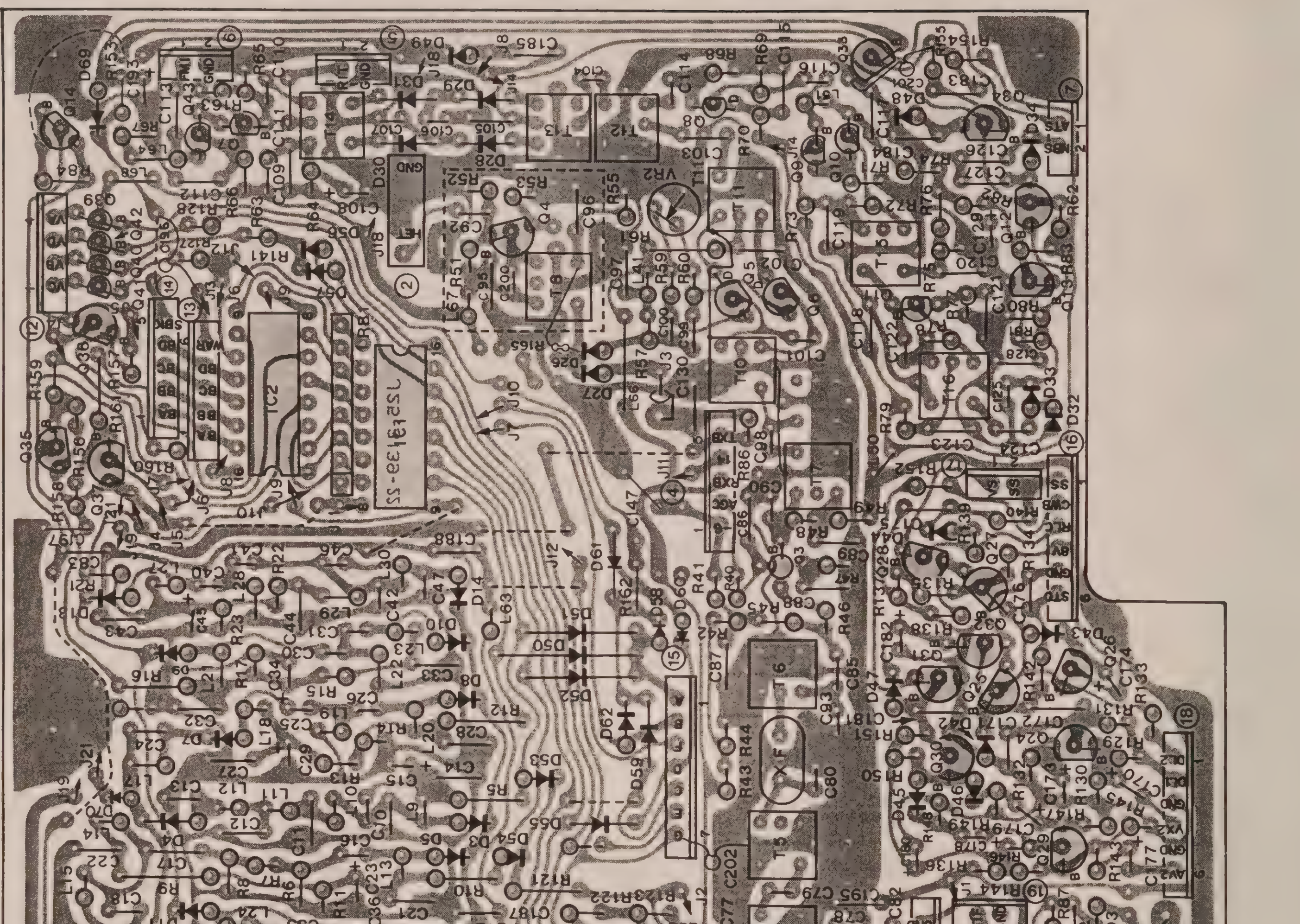


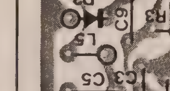
PN126S

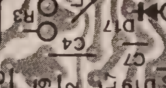


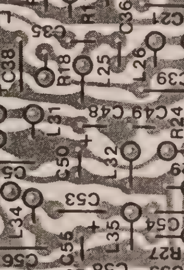
TS-430S PC BOARD VIEW

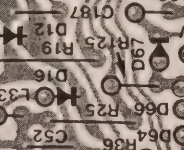
RF UNIT (X44-1510-11) **Component side view**

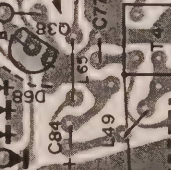


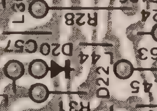

2SA1015
2SC1815
2SC1959
2SC2703

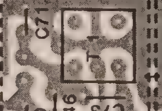

2SC2538

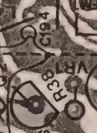

2SC460

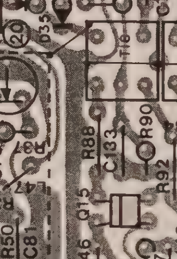

2SA562

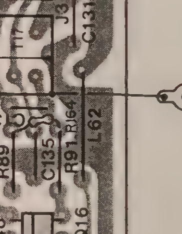

2SK125


2SC2603


2SK192A

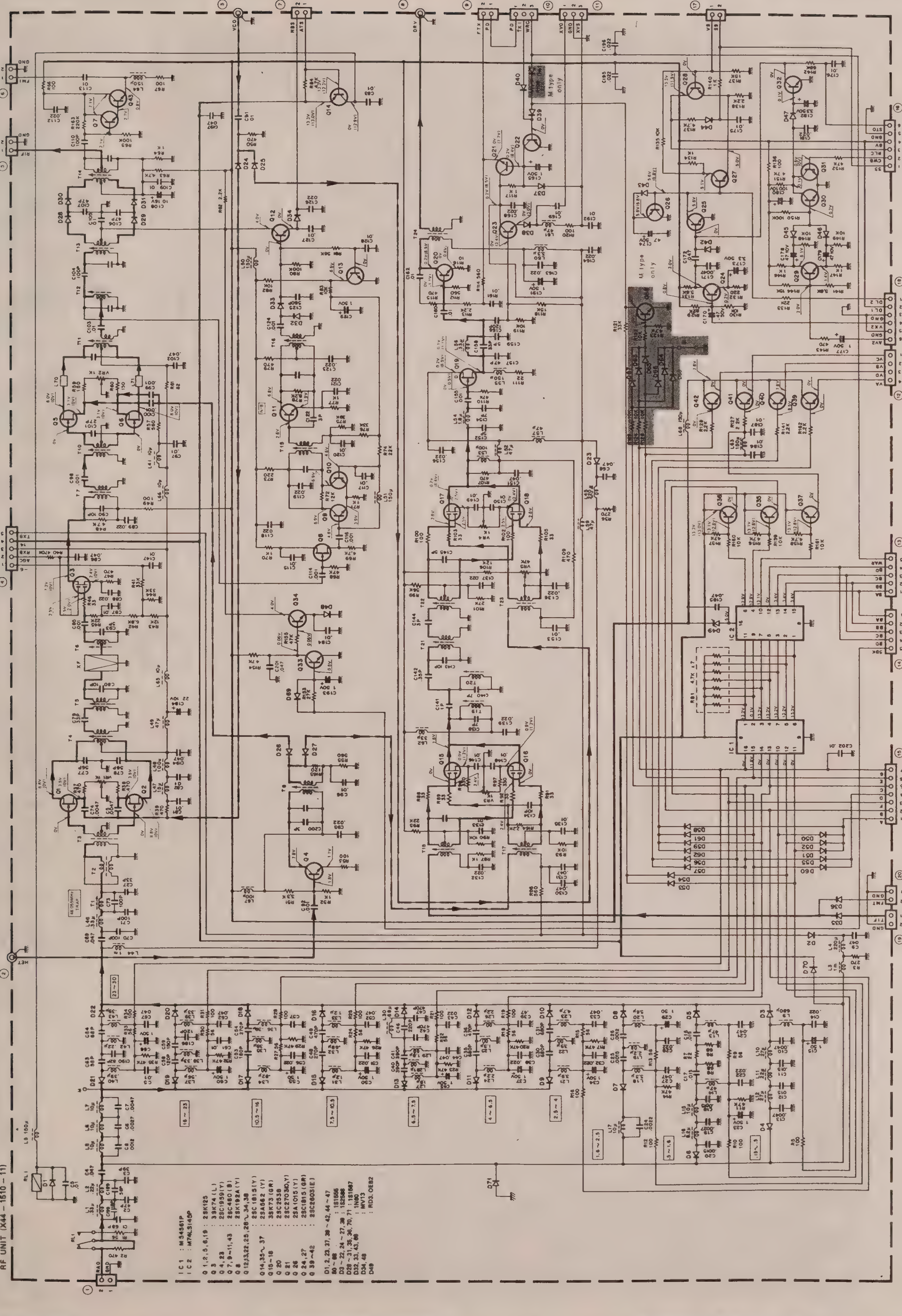

3SK73


3SK74


MV-13

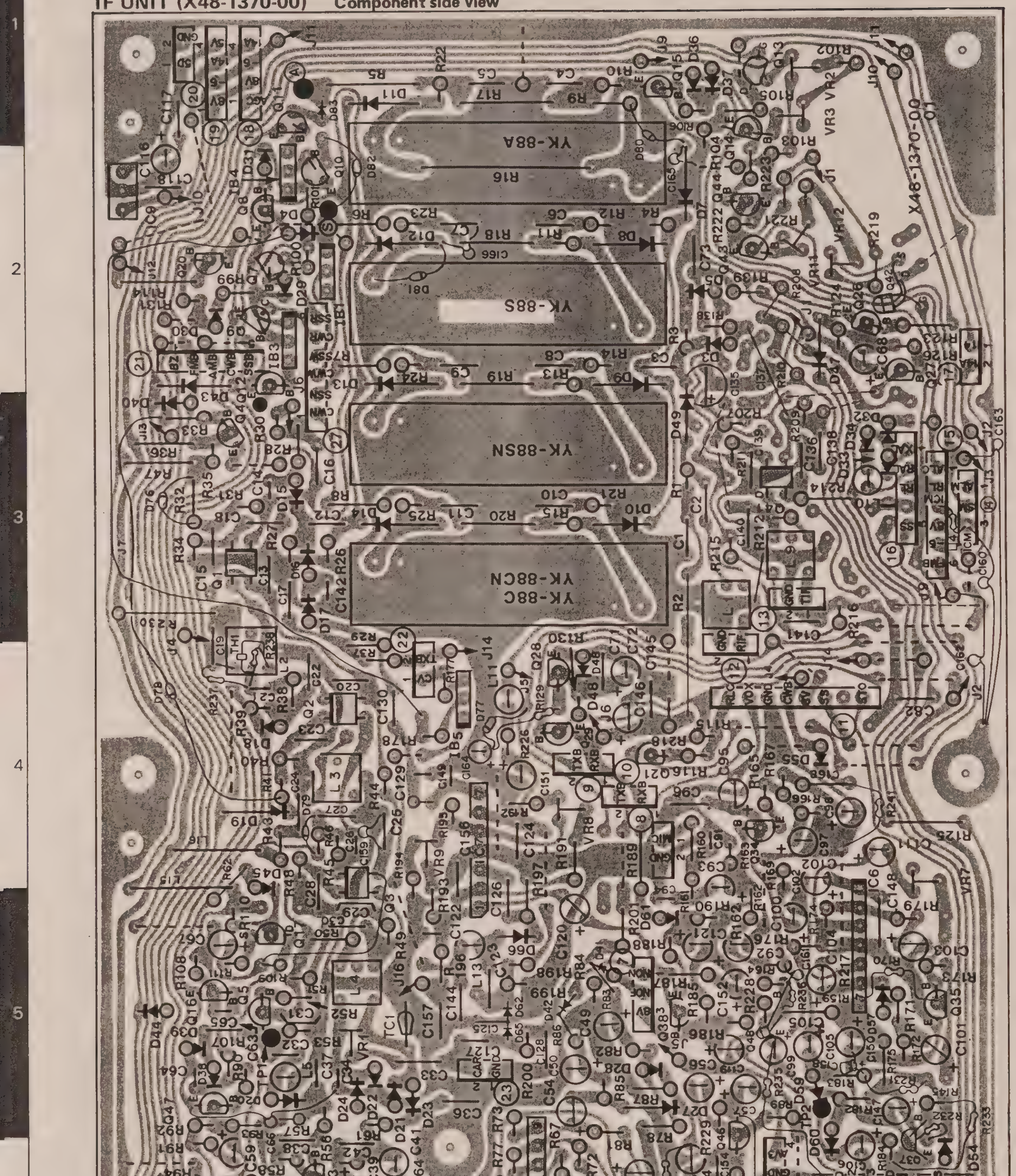
CIRCUIT DIAGRAM TS-430S

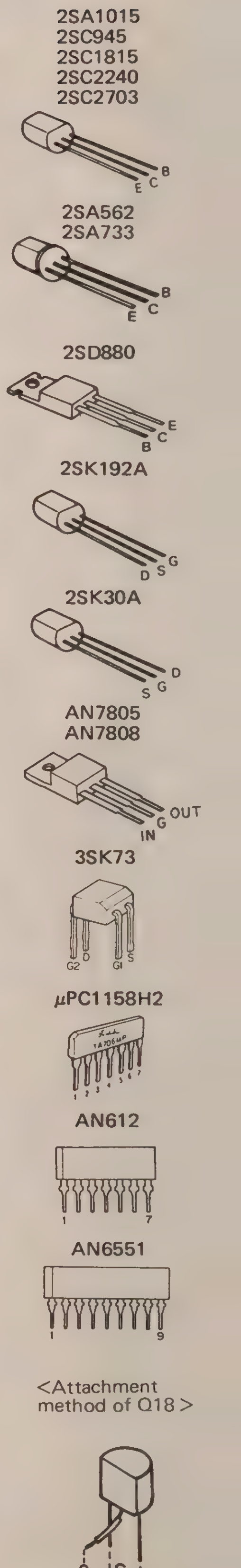
RF UNIT (X44-1510-11)



TS-430S PC BOARD VIEW

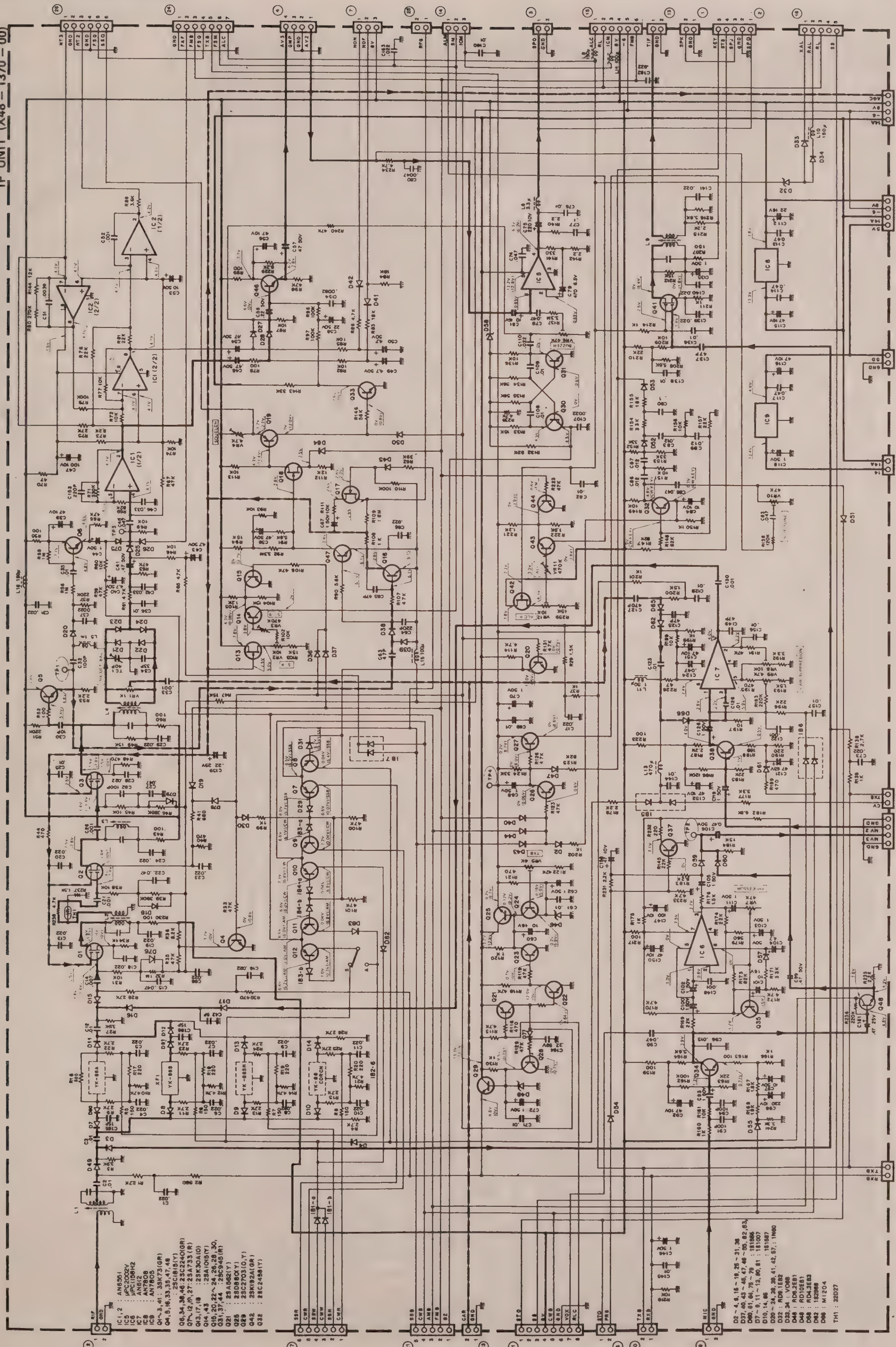
IF UNIT (X48-1370-00) Component side view





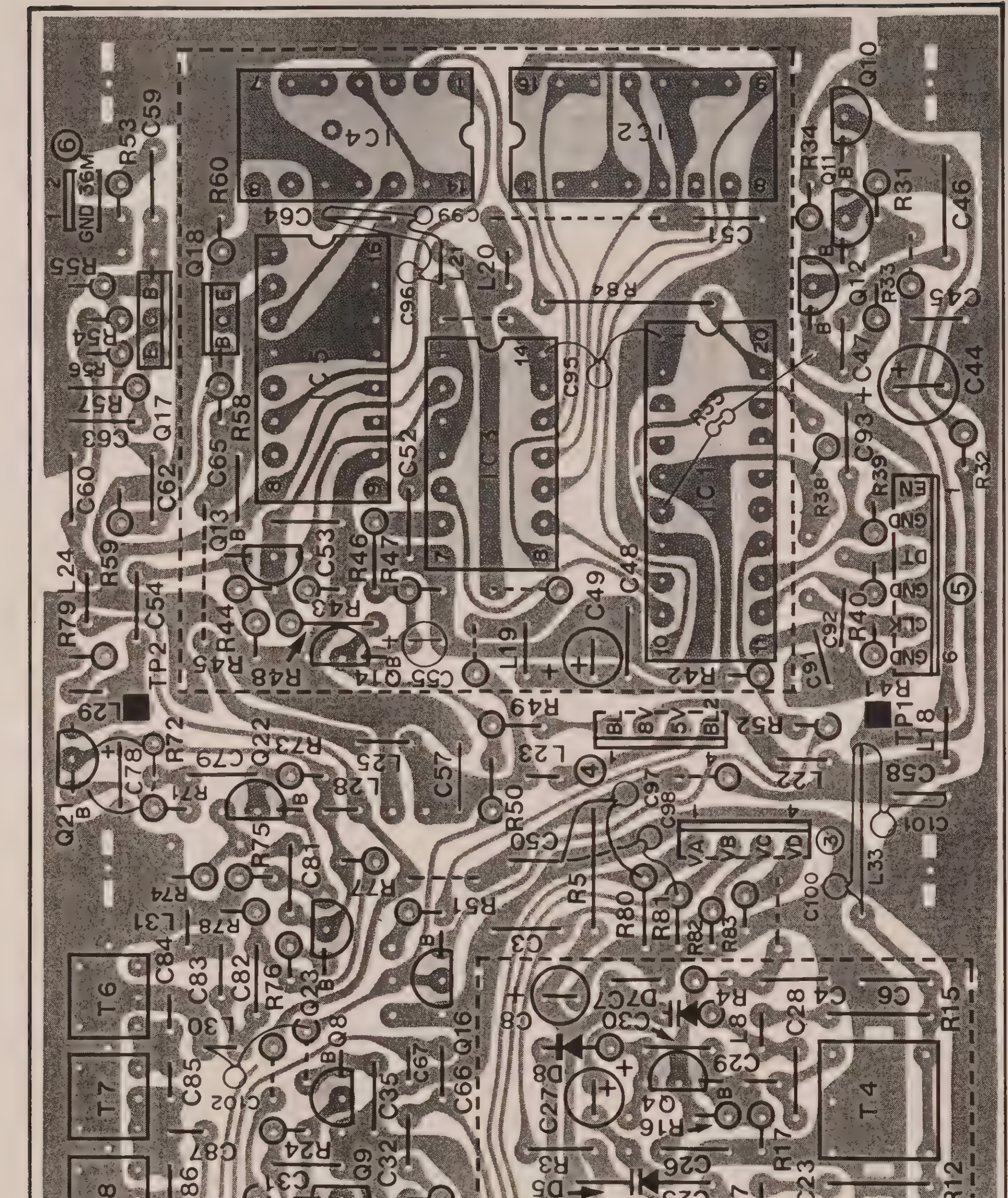
CIRCUIT DIAGRAM **TS-430S**

IF UNIT (X48-1370-00)

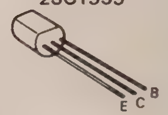


TS-430S PC BOARD VIEW

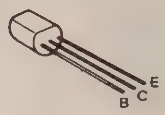
PLL UNIT (X50-1910-00) **Component side view**



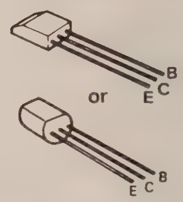
2SC1775
2SC1815
2SC1923
2SC1959



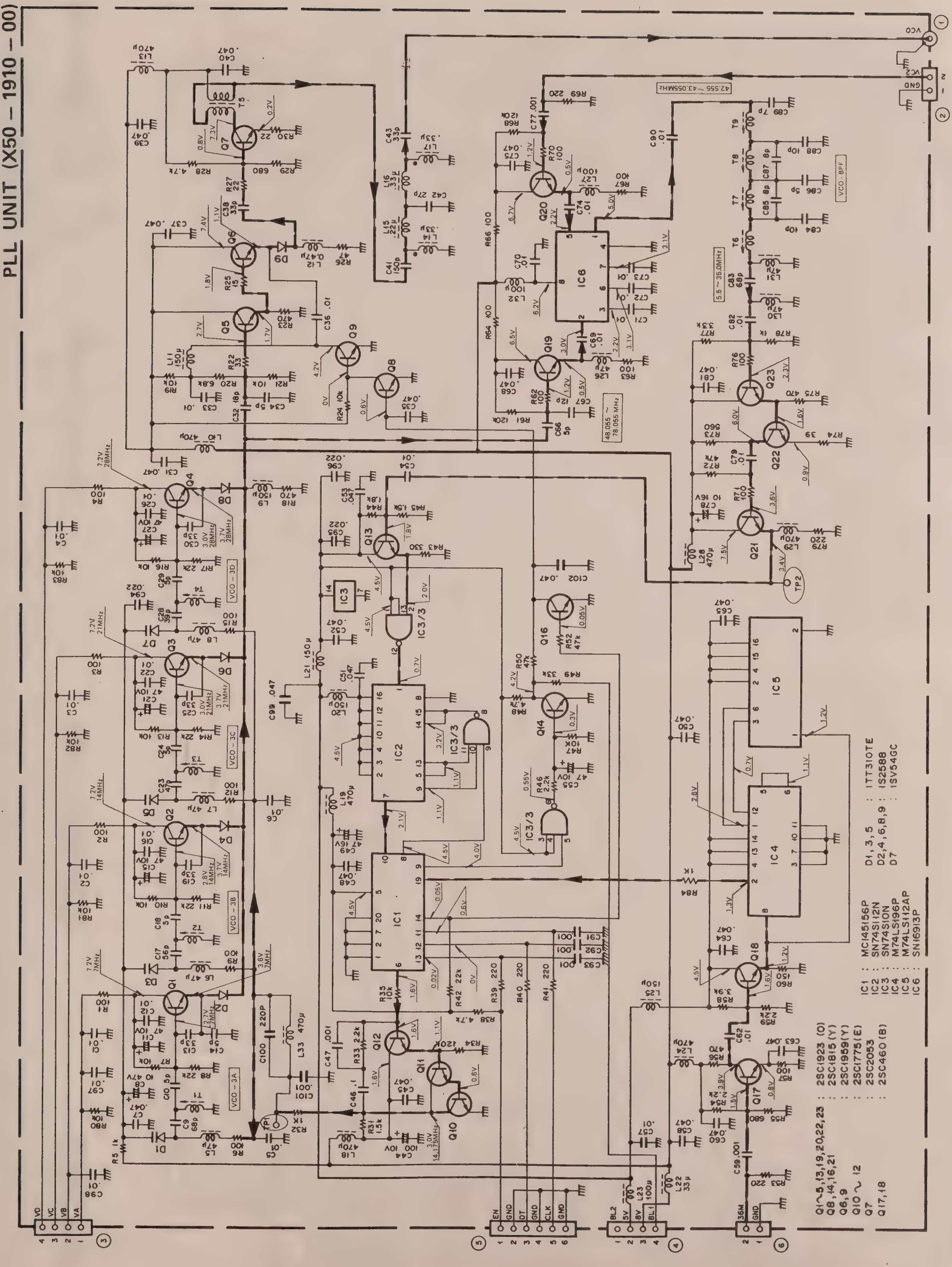
2SC2053



2SC460

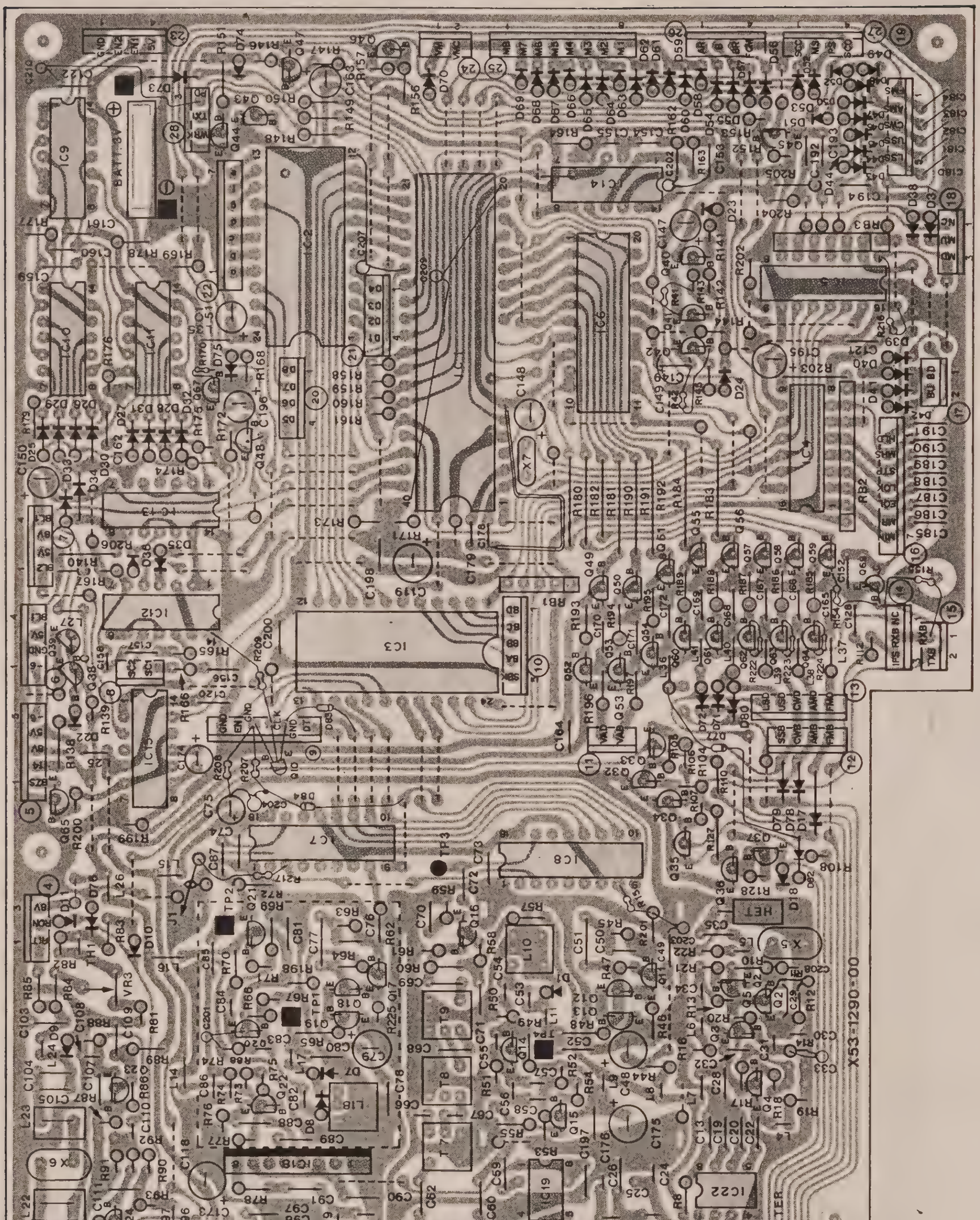


PLL UNIT (X50-1910-00)

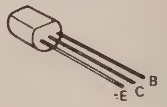


TS-430S PC BOARD VIEW

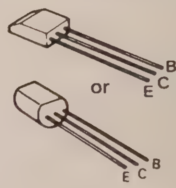
CONTROL UNIT (X53-1290-00) **Component side view**



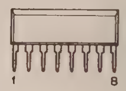
2SA1015
2SC945
2SC1775
2SC1815
2SC1923
2SC1959



2SC460

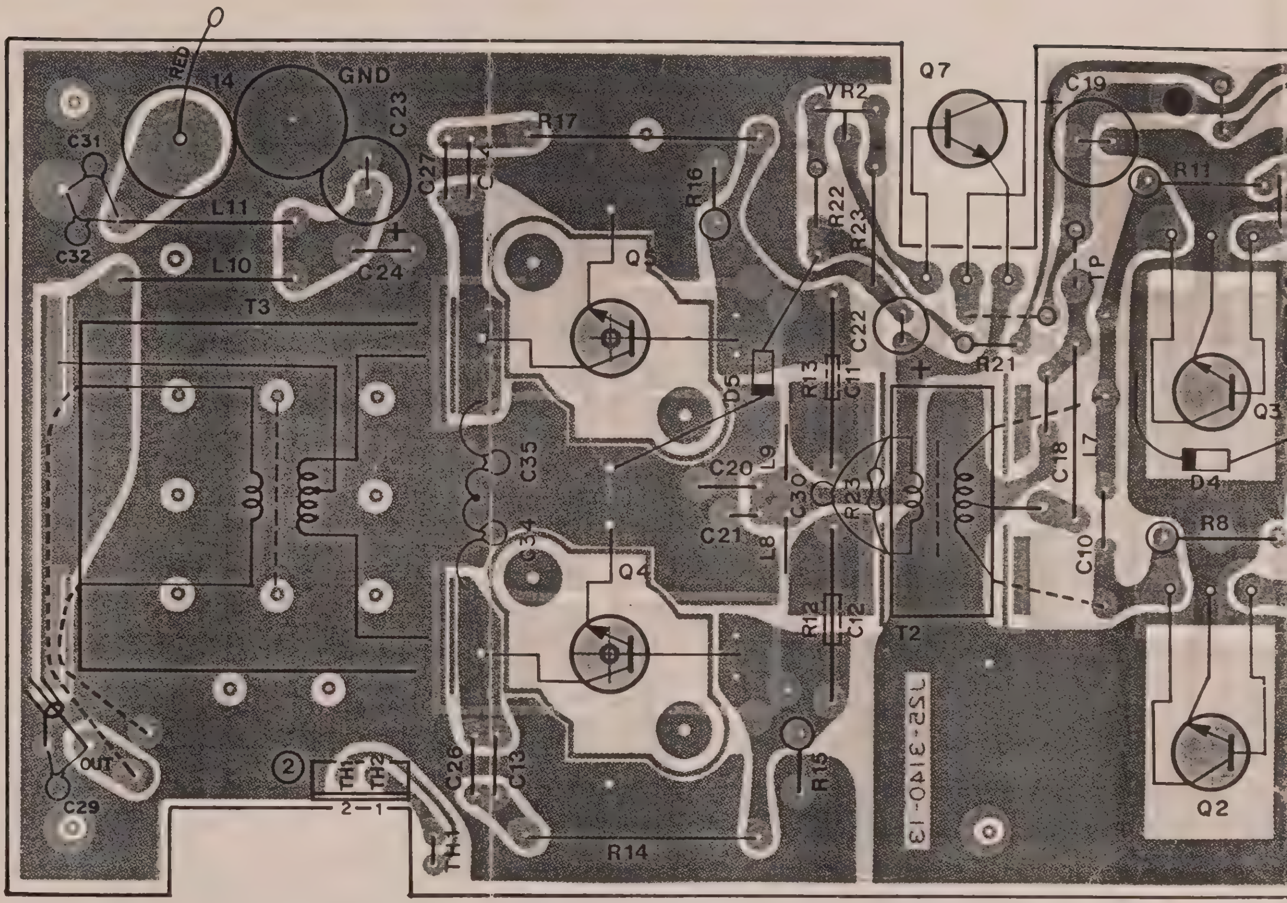


M54459L

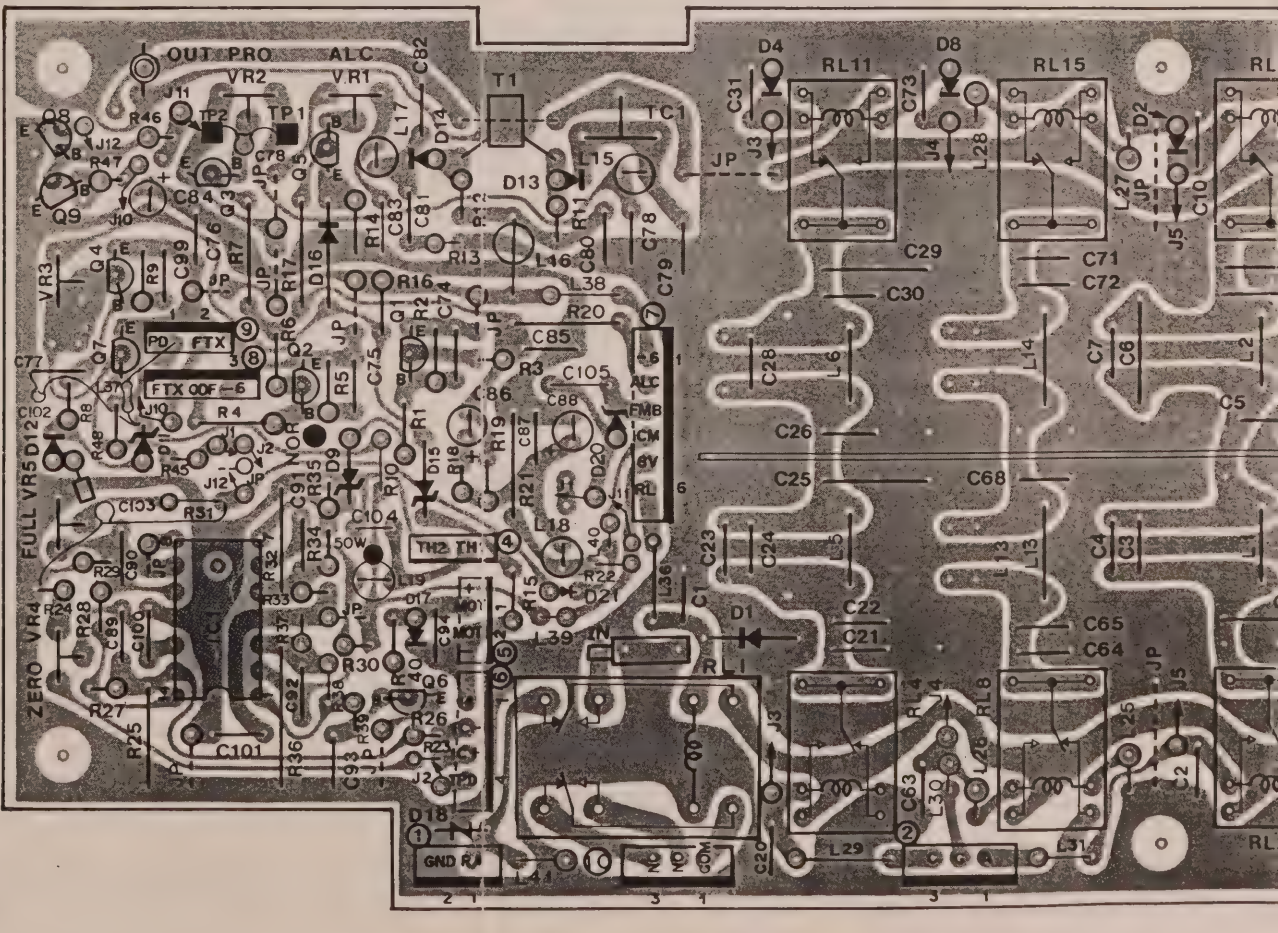


TS-430S PC BOARD VIEWS

100W FINAL UNIT (X45-1280-00) Component side view

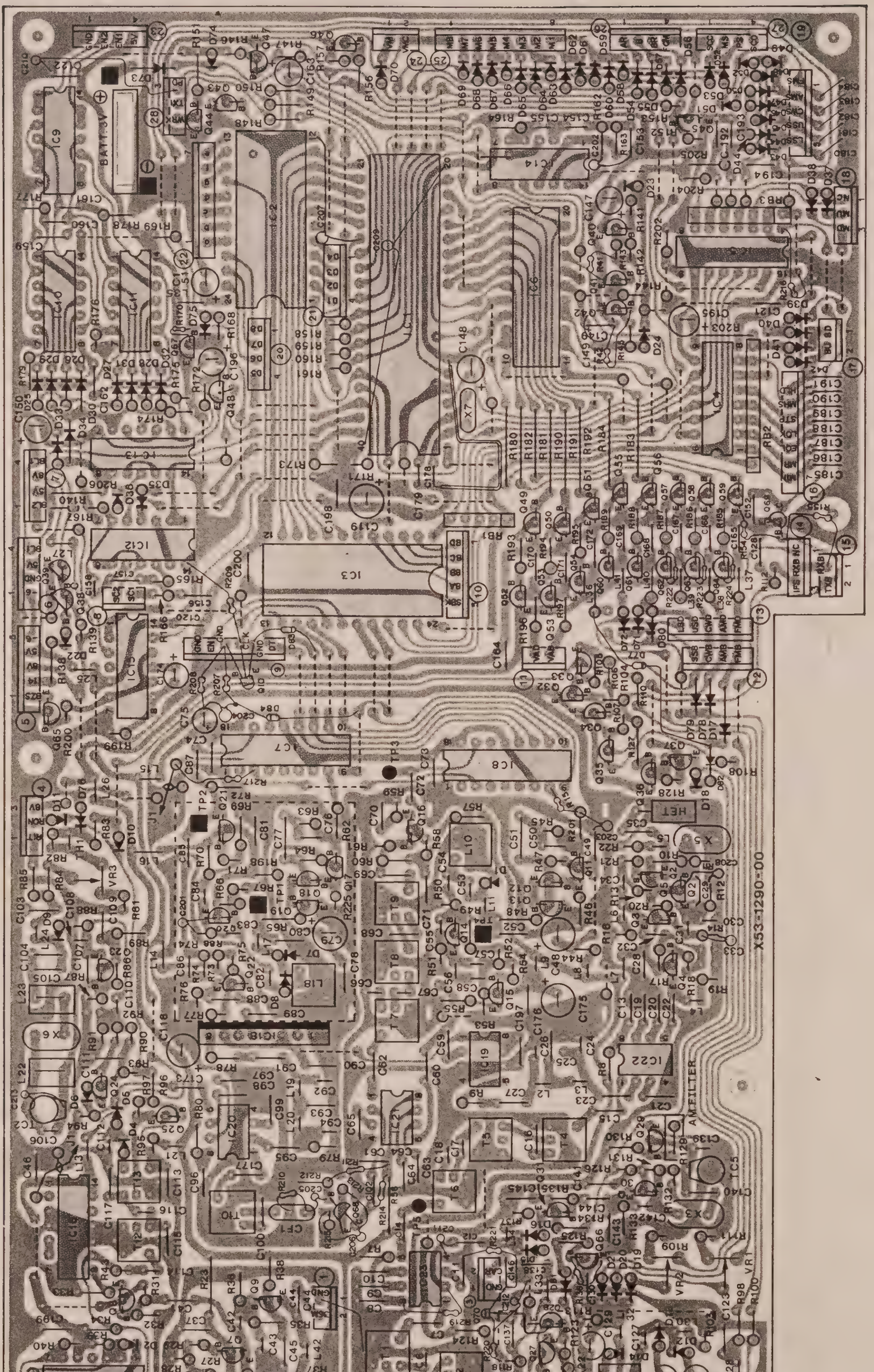


FILTER UNIT (X51-1290-00) Component side view

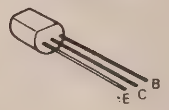


TS-430S PC BOARD VIEW

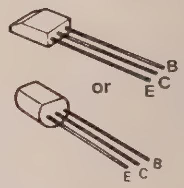
CONTROL UNIT (X53-1290-00) **Component side view**



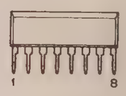
2SA1015
2SC945
2SC1775
2SC1815
2SC1923
2SC1959



2SC460

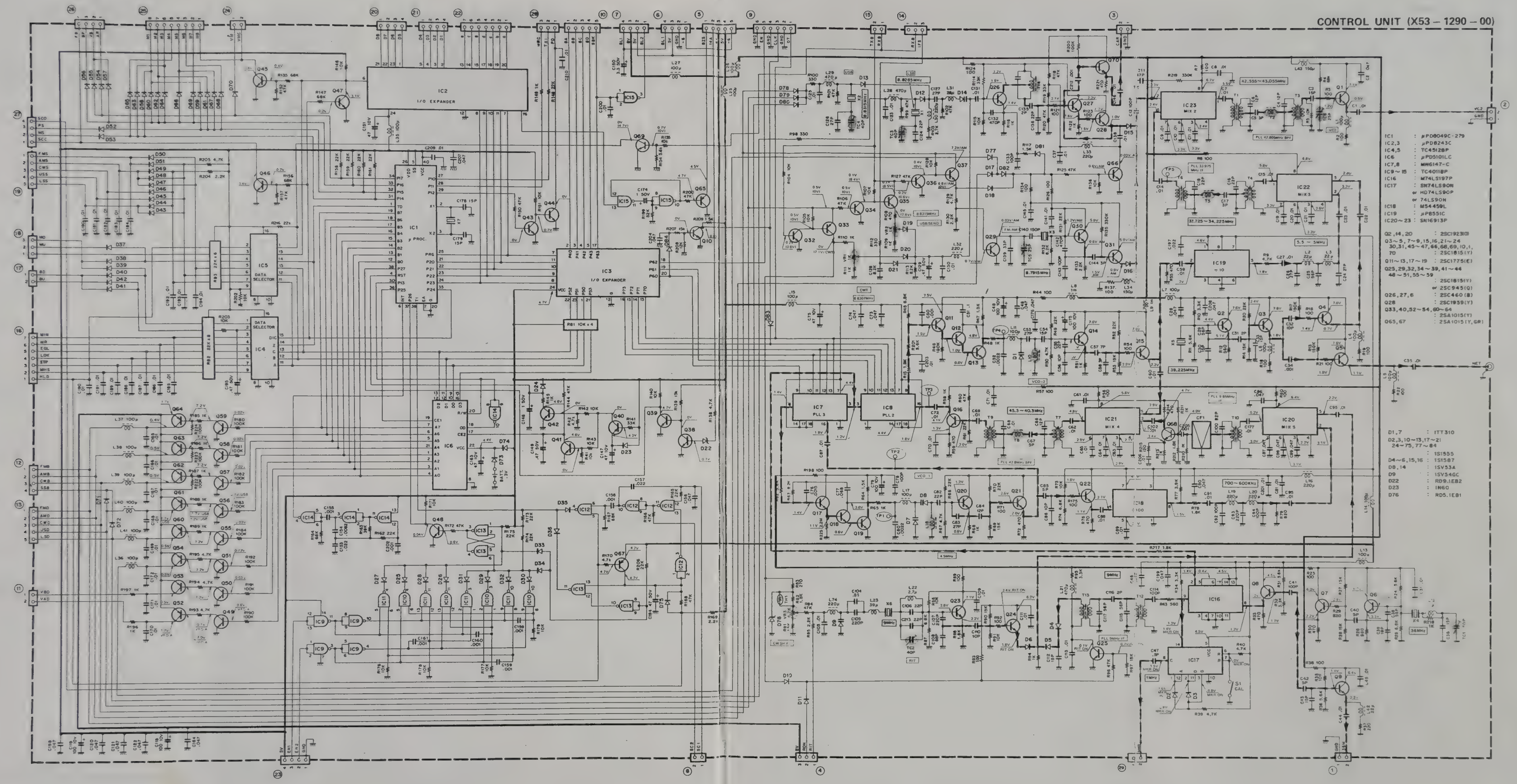


M54459L

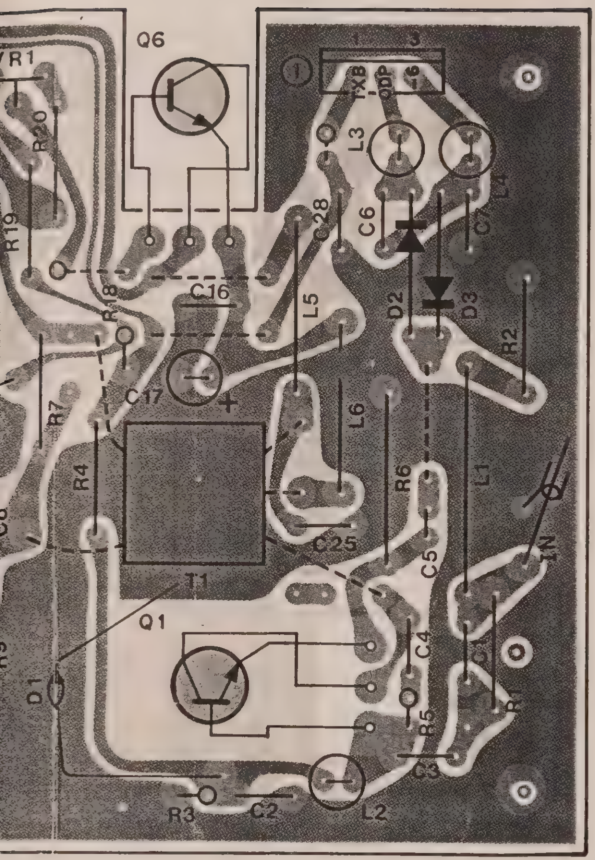


CIRCUIT DIAGRAM TS-430S

CONTROL UNIT (X53 – 1290 – 00)

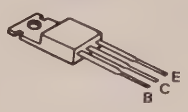


IC1	:	μPD8049C-279
IC2,3	:	μPD8243C
IC4,5	:	TC4512BP
IC6	:	μPD5101LC
IC7,8	:	MN6147-C
IC9~15	:	TC4011BP
IC16	:	M74LS197P
IC17	:	SN74LS90N
	or	HD74LS90P
	or	74LS90N
IC18	:	M54459L
IC19	:	μPB551C
IC20~23	:	SN16913P
Q2,14,20	:	2SC1923(O)
Q3~5,7~9,15,16,21~24 30,31,45~47,66,68,69,10,1, 70	:	2SC1815(Y)
Q11~13,17~19	:	2SC1775(E)
Q25,29,32,34~39,41~44 48~51,55~59	:	2SC1815(Y)
	or	2SC945(Q)
Q26,27,6	:	2SC460(B)
Q28	:	2SC1959(Y)
Q33,40,52~54,60~64	:	2SA1015(Y)
Q65,67	:	2SA1015(Y,GR)
D1,7	:	ITT310
D2,3,10~13,17~21 24~75,77~84	:	1S1555
D4~6,15,16	:	1S1587
D8,14	:	1SV53A
D9	:	1SV54GC
D22	:	RD9.1EB2
D23	:	1N60
D76	:	RD5.1EB1

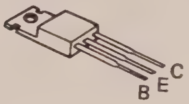


Q1 : 2SC2075 Q2,3 : 2SC2509
Q4,5 : 2SC2290*J Q6,7 : 2SD880(Y)
D1 : MV-5T D2,3 : 1N60 D4,5 : SV03Y
TH1 : SDT1000F

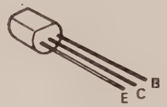
2SC2075
2SD880



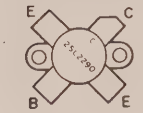
2SC2509

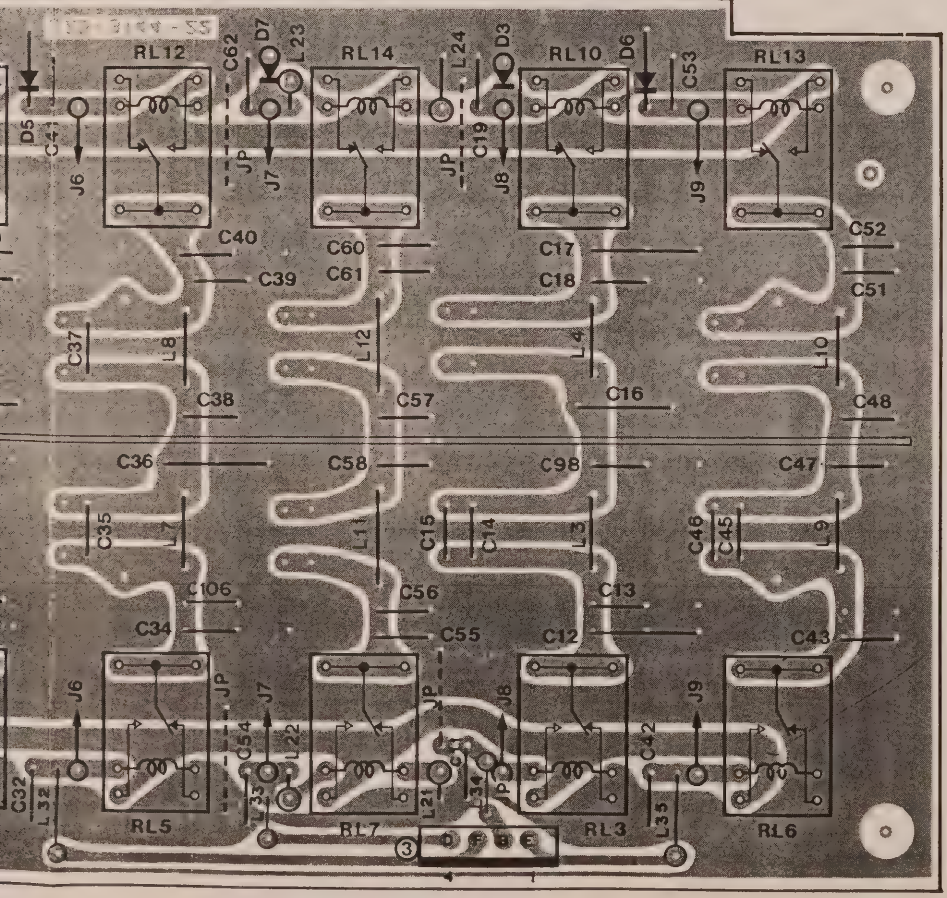


2SC1815
2SC1959



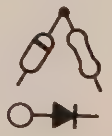
2SC2290*J



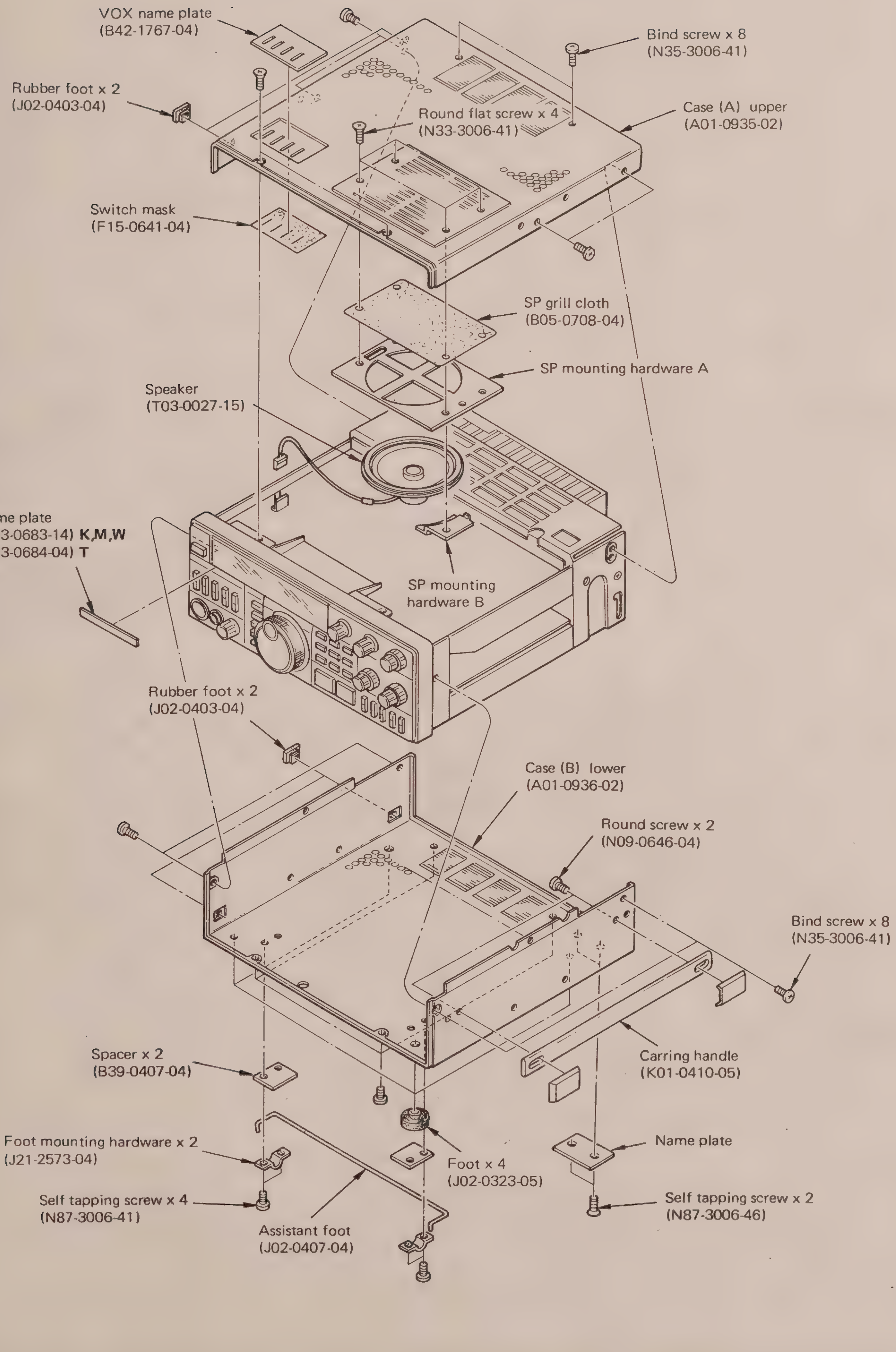


Q1–5,7–9 : 2SC1815(Y) Q6 : 2SC1959(Y)
D1–8,12,17,21 : 1S1555
D9,11,15,20 : RD9.1EB3 D13,14 : 1N60
D16 : RD4.3EB3 D18 : ERZD03DK331
IC1 : MB3614

<Attachment method of D21,L40>

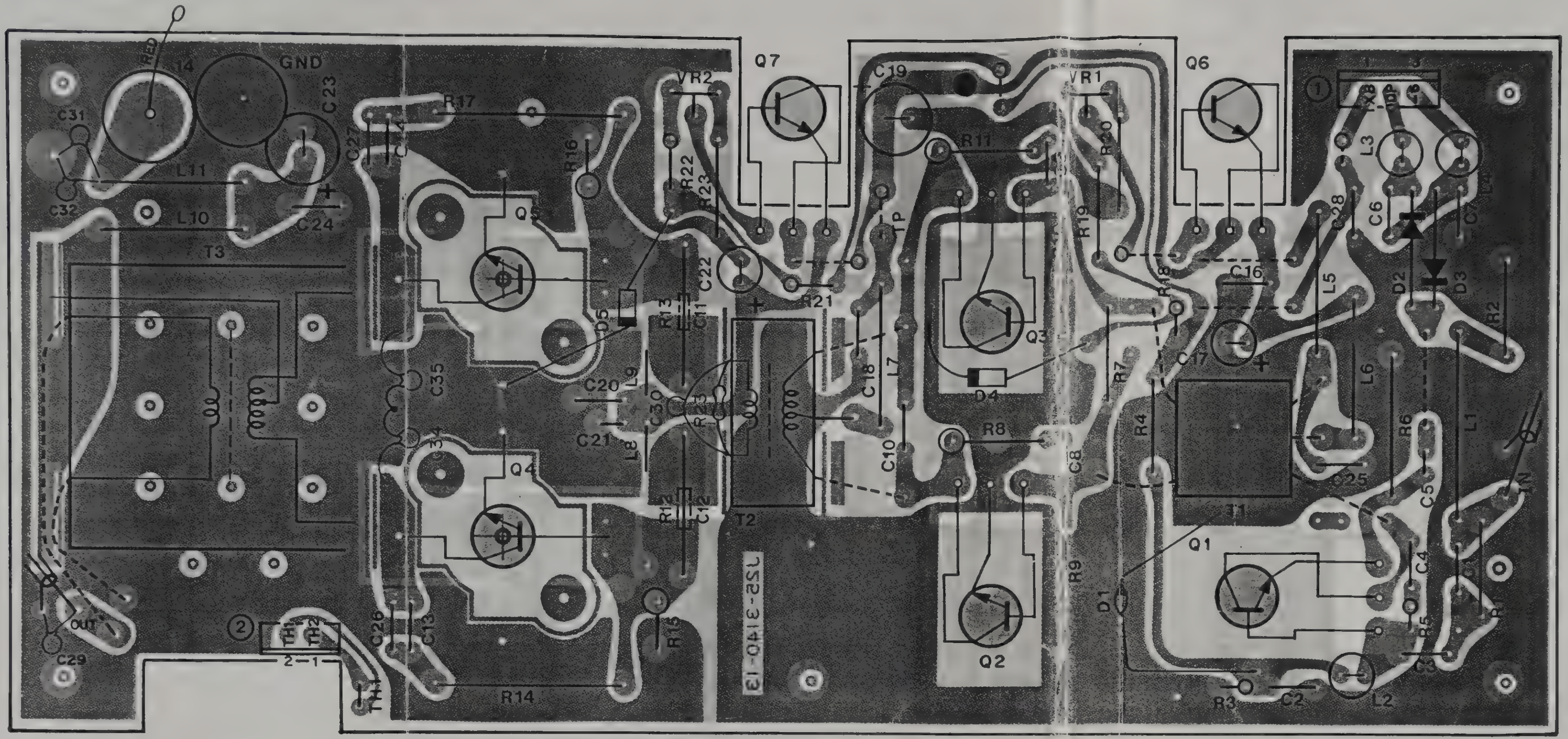


DISASSEMBLY



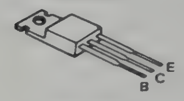
TS-430S PC BOARD VIEWS

100W FINAL UNIT (X45-1280-00) Component side view

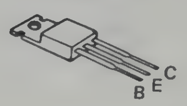


Q1 : 2SC2075 Q2,3 : 2SC2509
Q4,5 : 2SC2290•J Q6,7 : 2SD880(Y)
D1 : MV-5T D2,3 : 1N60 D4,5 : SV03Y
TH1 : SDT1000F

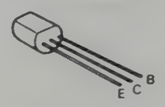
2SC2075
2SD880



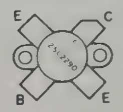
2SC2509



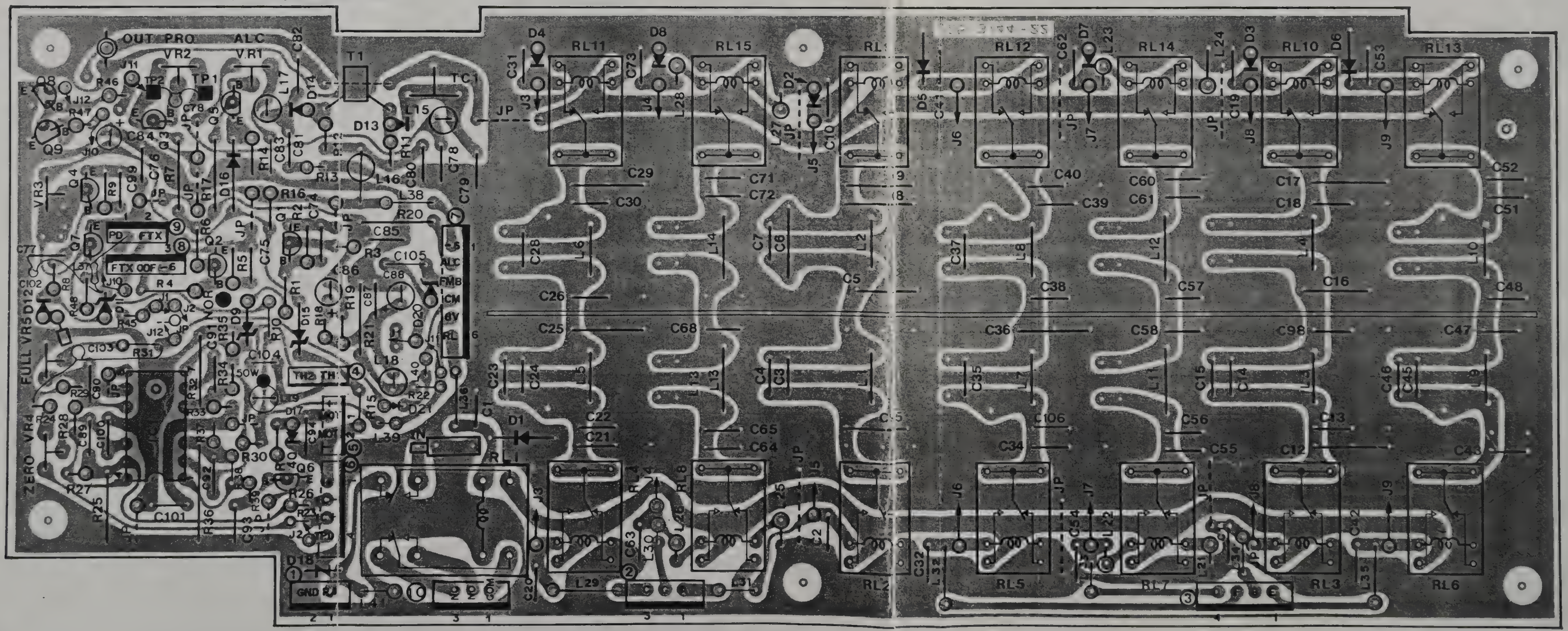
2SC1815
2SC1959



2SC2290•J

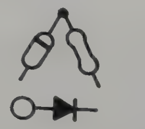


FILTER UNIT (X51-1290-00) Component side view

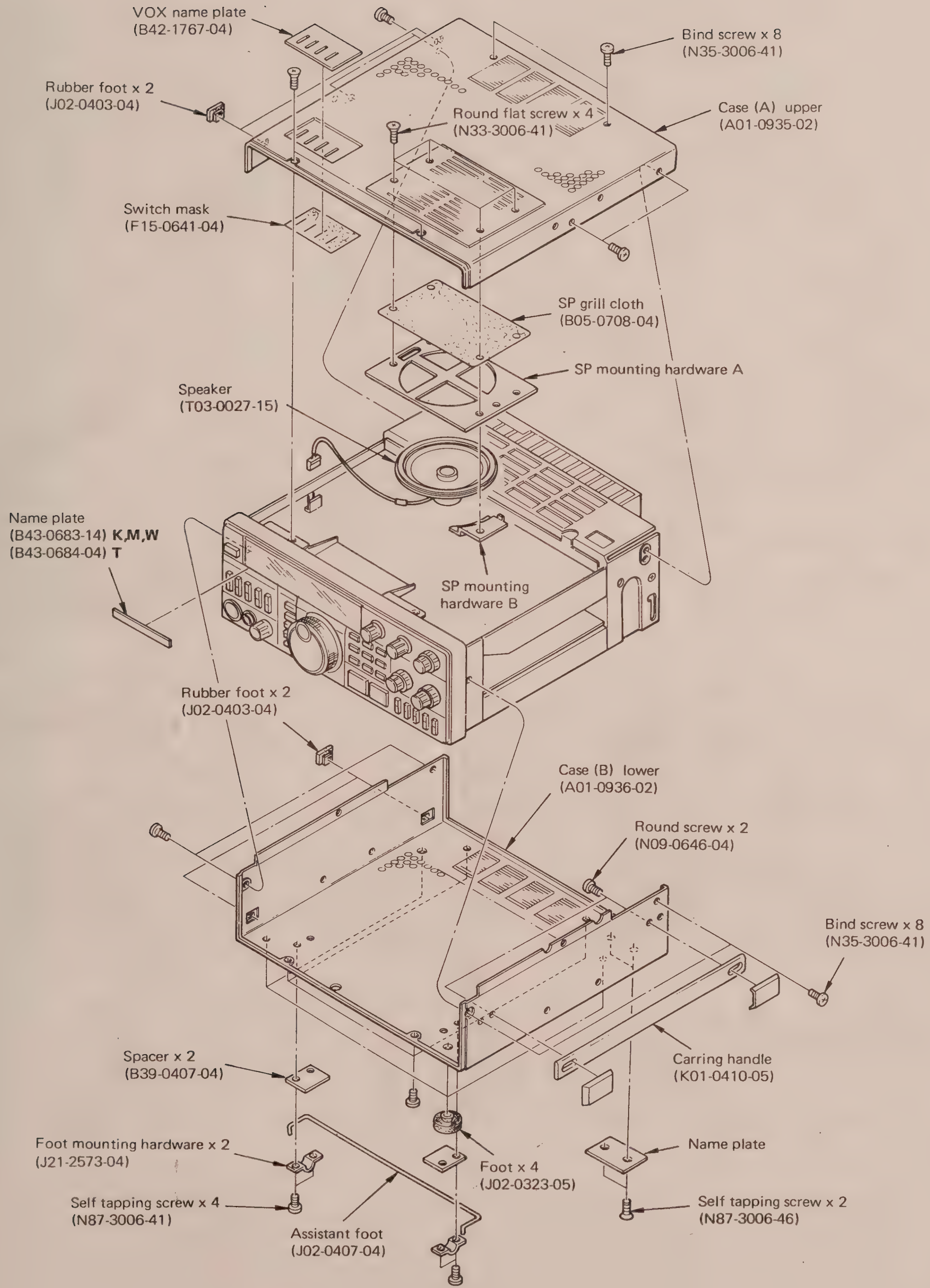


Q1–5,7–9 : 2SC1815(Y) Q6 : 2SC1959(Y)
D1–8,12,17,21 : 1S1555
D9,11,15,20 : RD9.1EB3 D13,14 : 1N60
D16 : RD4.3EB3 D18 : ERZD03DK331
IC1 : MB3614

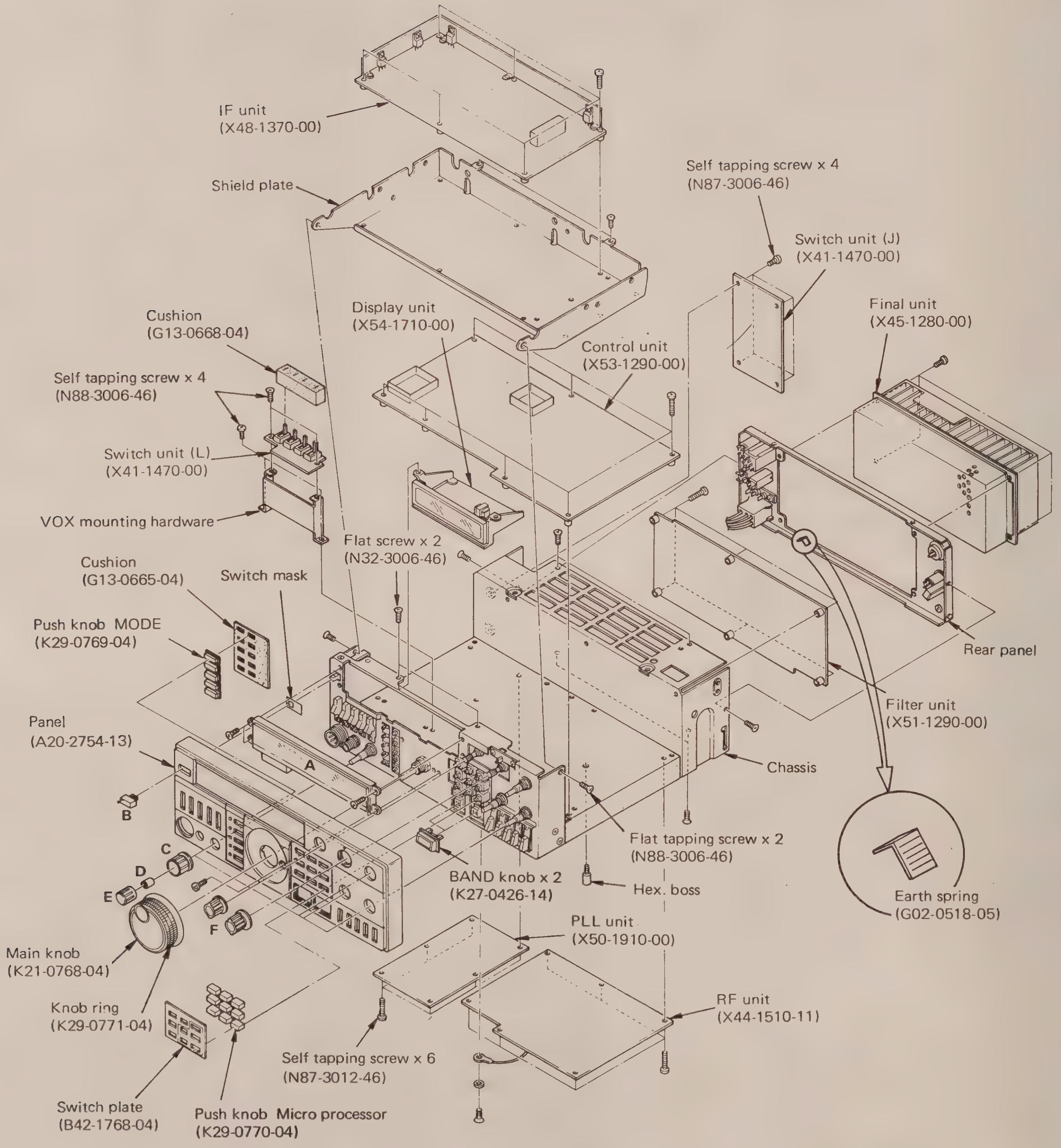
<Attachment method of D21,L40 >



DISASSEMBLY



DISASSEMBLY



A Meter
(B31-0639-05)

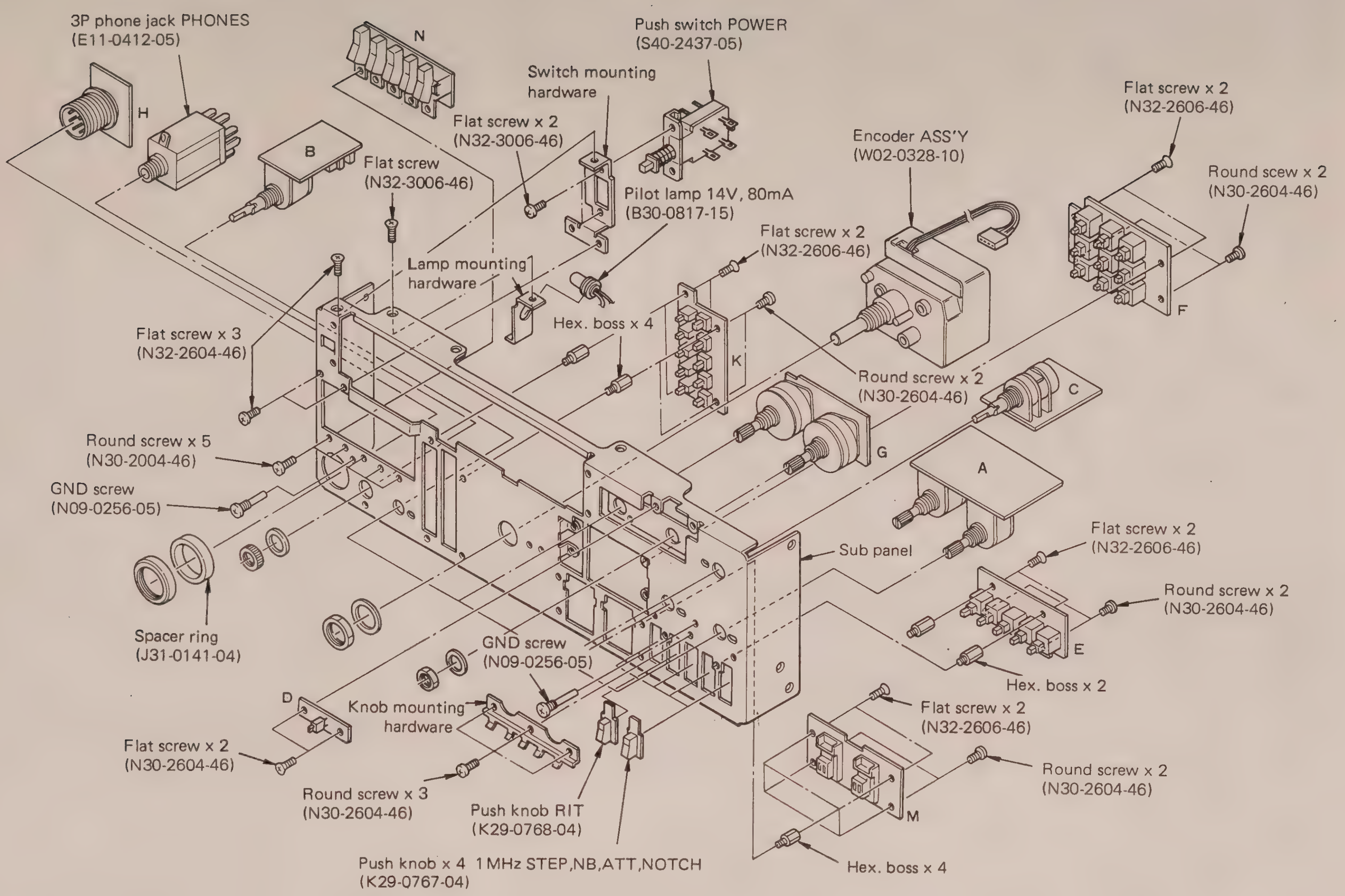
B Push knob POWER
(K29-0758-04)

C Knob (outside) x 4 RF,CAR,SQL,IF SHIFT
(K29-0741-24)

D Knob fixed spring x 4
(G02-0505-05)

E Knob (inside) x 4 AF,MIC,NOTCH,RIT
(K23-0710-04)

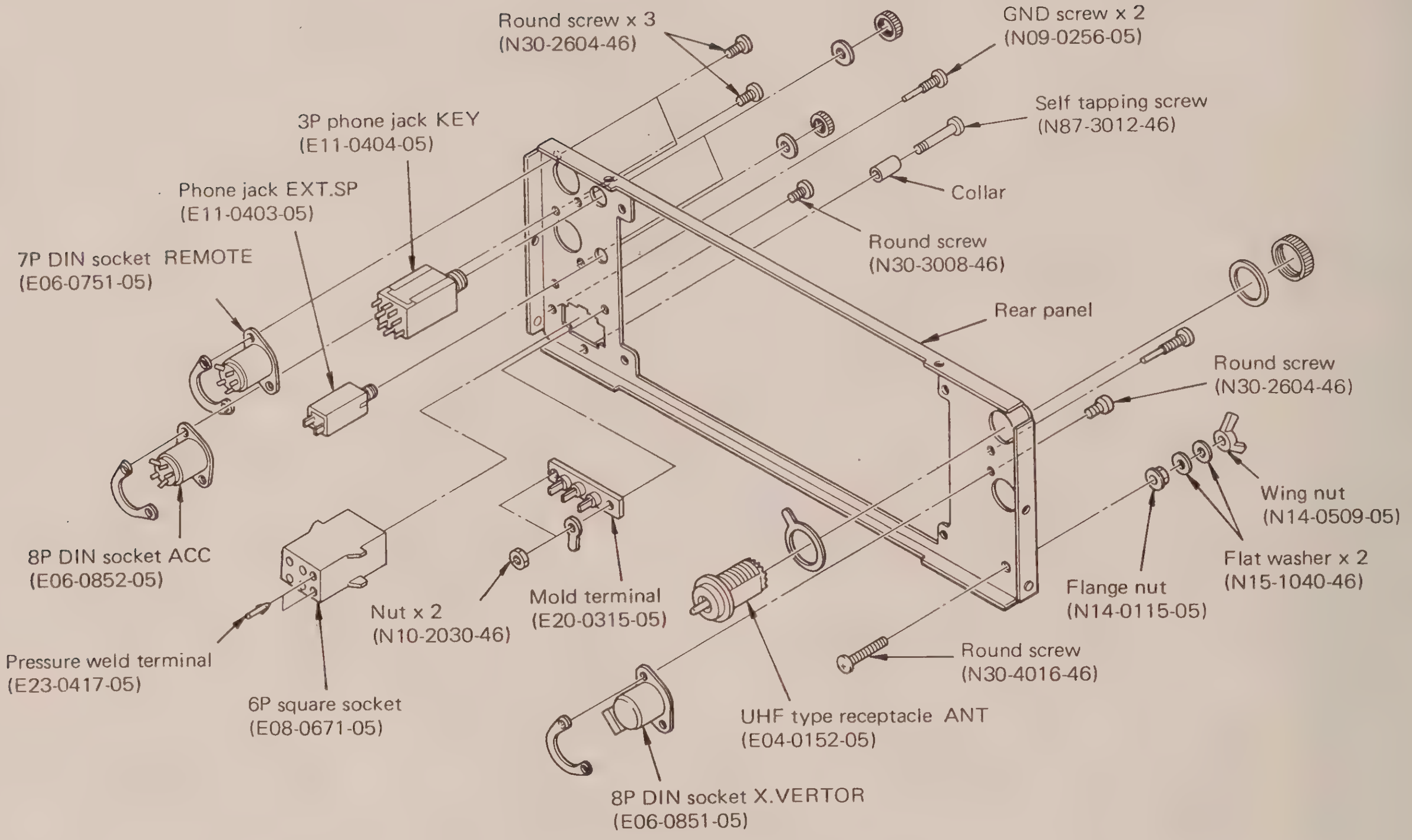
F Pointer knob x 2 FUNCTION,M.CH
(K23-0753-04)



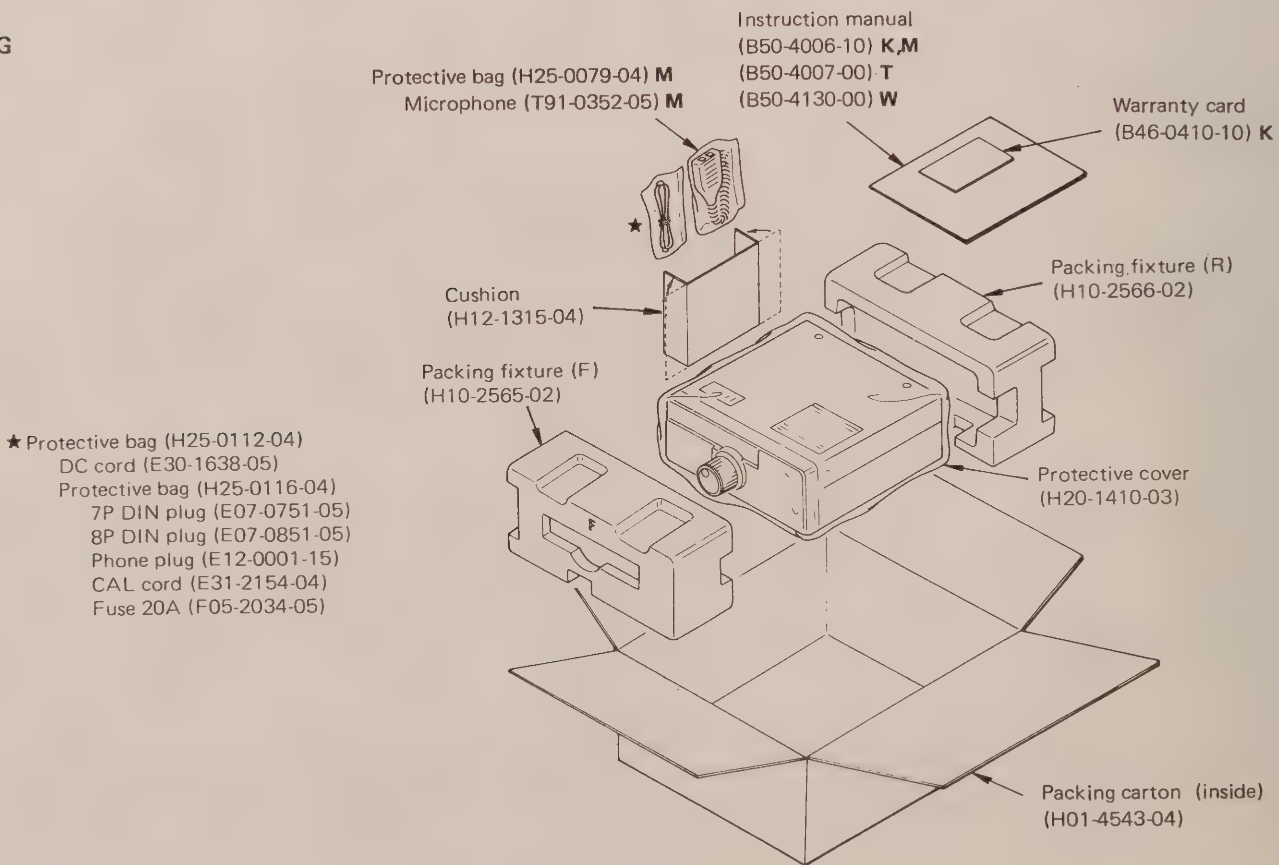
SWITCH UNIT A~N

A	VR2	(R19-3416-05)	Pot. AF/RF
	VR3	(R19-3417-05)	Pot. RIT/IF SHIFT
B	VR4	(R19-3415-05)	Pot. MIC/CAR
C	VR5	(R24-9403-15)	Pot. NOTCH/SQL
D	D8	(SY438D)	LED M.CH
E	S19–23	(S40-2440-15)	Push knob 1MHz STEP, RIT, NB, ATT, NOTCH
F	S5,9,10	(S40-2441-15)	Push knob A=B, MR, M.IN
	S6–8,11–13	(S40-2441-15)	Push knob LOCK, STEP, M.CH, MS, PG.S, HOLD
G	S1	(S29-1428-05)	Rotary switch M.CH
	S2	(S29-1427-05)	Rotary switch FUNCTION
H	–	(E06-0853-05)	8P metal socket MIC
K	S24–28	(S50-1411-05)	Tact switch MODE
	D3–5	(SG238D)	LED LSB, USB, CW
	D6,7	(SY438D)	LED AM, FM
M	S3,4	(S50-1409-05)	Tact switch BAND
N	S14,15	(S36-2408-05)	Paddle switch SEND/REC, VOX/MAN
	S16–18	(S36-2411-05)	Paddle switch PROC, ALC/IC, NAR/WIDE

DISASSEMBLY/PACKING



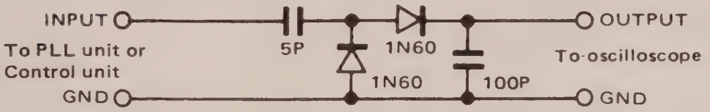
PACKING



ADJUSTMENT

REQUIRED TEST EQUIPMENT

1. **DC Voltmeter (DC V.M)**
   1) Input resistance : More than 1 MΩ
   2) Voltage range : 1.5 to 1000 V AC/DC
   NOTE : A high-precision multimeter may be used. However, accurate readings can not be obtained for high-impedance circuits.
2. **DC Ammeter**
   1) Current range : 1.5A, 3A, 20A, High-precision ammeter may be used.
3. **RF VTVM (RF V.M)**
   1) Input impedance : 1 MΩ and less than 3pF, min.
   2) Voltage range : 10 mV to 300 V
   3) Frequency range : 10 kHz to 100 MHz or greater
4. **AF Voltmeter (AF V.M)**
   1) Frequency range : 50 Hz to 10 kHz
   2) Input resistance : 1 MΩ or greater
   3) Voltage range : 10 mV to 30 V
5. **AF Generator (AG)**
   1) Frequency range : 200 Hz to 5 kHz
   2) Output : 1 mV or less to 1 V, low distortion
6. **AF Dummy Load**
   1) Impedance : 8Ω
   2) Dissipation : 3W or greater
7. **Oscilloscope**
   Requires high sensitivity, and external synchronization capability.
8. **Sweep Generator**
   1) Center frequency : 50 kHz to 90 MHz
   2) Frequency deviation : Maximum ±35 MHz
   3) Output voltage : 0.1 V or greater
9. **Standard Signal Generator (SSG)**
   1) Frequency range : 50 kHz to 50 MHz
   2) Output : −20 dB/0.1μV to 120 dB/1 V
   3) Output impedance : 50Ω
   4) AM and FM modulation can be possible.
   NOTE : Generator must ve frequency stable.
10. **Frequency Counter (f. counter)**
    1) Minimum input voltage : 50 mV
    2) Frequency range : 50 MHz or greater
11. **Noise Generator**
    Must generate ignition noise containing harmonics beyond 30 MHz.
12. **RF Dummy Load**
    1) Impedance : 150Ω
    2) Dissipation : 150 W or greater
13. **Power Meter**
    1) Impedance : 50Ω
    2) Dissipation : 150 W cintinuous or greater
    3) Frequency limits : 60 MHz or greater
14. **Spectrum Analyzer**
    1) Frequency range : 100 kHz to 110 MHz or greater
    2) Bandwidth : 1 kHz to 3 MHz
15. **Detector**
    1) For adjustment of PLL/VCO BPF



16. **Directional Coupler**
17. **Power supply**
    PS-430
18. **Microphone**
    MC-60A or MC-42S

PREPARATION

Unless otherwise specified, set the controls as follows.

POWER	ON	NAR/WIDE	WIDE
BAND	14	1 MHz STEP	OFF
AF	MIN	RIT SW	OFF
RF	MAX	NB SW	OFF
MIC	MIN	ATT SW	OFF
CAR	MIN	NOTCH SW	OFF
NOTCH	CEN	MODE	USB
SQUELCH	MIN	LOCK SW	OFF
MEMORY.CH.	1	STEP SW	OFF
FUNCTION	A	M.CH SW	OFF
SEND/REC	REC	MS SW	OFF
VOX/MAN	MAN	PG.S	OFF
PROCESSOR SW	OFF	HOLD	OFF

< REFERENCE >

Japanese "SG"	American "SG"
−6 dB	0.25 μV
0 dB	0.5 μV
6 dB	1 μV
12 dB	2 μV
24 dB	8 μV
30 dB	15.8 μV
40 dB	50 μV
50 dB	158 μV
60 dB	500 μV
70 dB	1.58 mV
80 dB	5 mV
90 dB	15.8 mV
100 dB	50 mV
120 dB	0.5 V

ADJUSTMENT

VOLTAGE CHECK, ADJUSTMENT

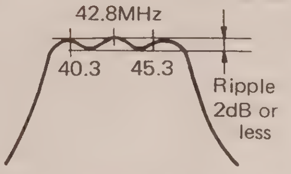
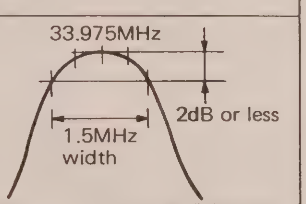
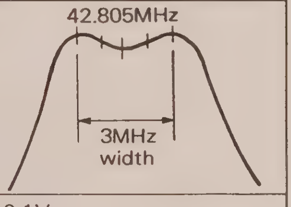
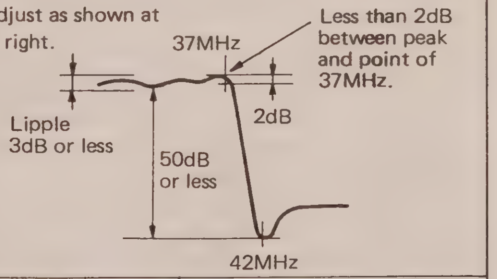
Item	Condition	Measurement			Adjustment			Specification/Remarks
		Test equipment	Unit	Terminal	Unit	Part	Method	
1. Voltage	1) POWER : ON RF GAIN : MAX MODE : USB STBY : REC	DC V.M	IF	⑲-1			Check	7.4–8.4V
				⑲-4				4.75–5.25V
				⑲-2				−5.8 – −6.3V
				⑨-1				8.3–9.1V
				⊕(BATT)				3.0V or more
				㉕-1	SW"A"	VR1	2.6V*1 or 2.8V*2	+0.05V,−0V
	2) STBY : SEND			TP4	IF	VR5	8.8V	±0.1V

IF UNIT Q1–3,41 : 3SK73(GR)*1
3SK73(BL)*2

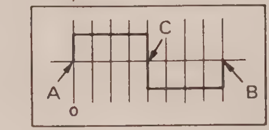
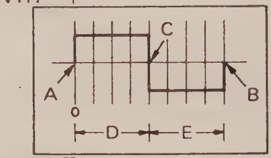
PLL ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specification/Remakrs
		Test equipment	Unit	Terminal	Unit	Part	Method	
1. Reference oscillator frequency	1) 36MHz	f. counter	Cont	①-2	Cont	TC1	36,000,000Hz	±10Hz
	2) HET (39.225MHz)			HET			Check	39,224,500–39,225,500Hz
2. RIT	1) RIT Pot. : CEN RIT SW : ON STBY : REC	f. counter	Cont	D5 cathode	Cont	TC2	9,000,000Hz	±50Hz Use oscilloscope's probe.
	2) RIT Pot. : Full CW (+)						Verify	8,990,000Hz or less
	RIT Pot. : Full CCW (−)							9,010,000Hz or more
	3) MODE : CW STBY : SEND					VR3	8,992,000Hz	±10Hz
3. CAR	1)	RF VTVM	Cont	③-2	Cont	T14	0.28V (Turn core out from peak)	
	2) MODE : USB IF SHIFT Pot. :CEN STBY : REC	f. counter				TC4	8,831,500Hz	±10Hz*
	STBY : SEND					VR2	No change in freq.	±10Hz
	3) IF SHIFT Pot. : Full CW STBY : REC	* Note : This is an initial adjustment only. You must also perform dyrp 10 of the TX adjustment if you adjust TC3 and or TC4.					Verify	8,832,400Hz or more
	IF SHIFT Pot. : Full CCW							8,830,600Hz or less
	4) MODE : LSB IF SHIFT Pot. : Centerd STBY : REC					TC3	8,828,500Hz	±10Hz*
	5) MODE : CW STBY : SEND					VR1	8,830,700Hz	±10Hz
	6) MODE : FM STBY : SEND					TC5	8,791,500Hz	±10Hz
	7) MODE : AM						Verify	8,789,850–8,790,150Hz
4. VCO-1 (Voltage control oscillator)	1) FREQ : □□.□□0.0kHz To obtain this frequency 1st set dial to □9.9□. Then using mic push button depress UP button one step. (10Hz/step obtained by mic UP or DOWN button).	DC V.M	Cont	TP1	Cont	L18	6.0V	±0.1V
	2) FREQ : □□.□□9.9$\boxed{9}$ kHz To obtain this frequency 1st set dial to □0.0$\boxed{0}$. Then depress mic up or down button one step.						Verify	2.1V±0.5V
5. PLL 9MHz IF	1) RIT SW : OFF	RF VTVM	Cont	IC20-5	Cont	T12,13	MAX	(150mV)
6. PLL 9.65MHz IF	1) FREQ : □□.□□5.0kHz RIT SW : OFF	RF VTVM	Cont	Q68-C	Cont	T10	MAX	(160mV)

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specification/Remarks
		Test equipment	Unit	Terminal	Unit	Part	Method	
7. PLL 42.8MHz BPF	1) Connect a 0.01μF capacitor between Q14 Base and GND. (To stop oscillation) Disconnect the capacitor after adjustment.	Sweep Gen. Detector Oscillo-scope	Cont	IC21-5 TP3	Cont	T7,8,9	Adjust as shown at right.	
8. PLL 33.975MHz BPF	1) Connect a 0.01μF capacitor between Q14 Base and GND. (Stop oscillation) Disconnect the capacitor after adjustment.	Sweep Gen. Detector Oscillo-scope	Cont	IC22-5 TP5	Cont	T4,5,6	Adjust as shown at right.	
9. PLL 42.805MHz BPF	1) Disconnect connector ② VC2. Reconnect connector ② after adjustment. Connect a 0.01μF capacitor between D15 cathode and GND. Disconnect the capacitor after adjustment.	Sweep Gen. Detector Oscillo-scope	Cont	TP5 ②-2	Cont	T1,2,3	Adjust as shown at right.	
10. VCO-2	1) FREQ : □□,000.0$\boxed{0}$ kHz To obtain this frequency 1st set dial to □,999.9$\boxed{9}$. Then using mic push button depress UP button one step.	DC V.M	Cont	TP4	Cont	L10	6.5V	±0.1V
	2) FREQ : □□,999.9$\boxed{9}$ kHz To obtain this frequency 1st set dial to □,000.0$\boxed{0}$. Then using mic push button depress DOWN button one step.						Check	2.1V±0.5V
11. VC2 level		RF VTVM	Cont	Connec-tor ②	Cont	TC6	50mV	±1dB
12.VCO-BPF	1) Disconnect PLL unit connec-tor ②. Reconnect connector ② after adjustment. Connect 560Ω resistor in Tracking Gen. output line. Use high impedance probe to connect to spectrum analyzer. (or connect 150Ω in seriers)	Tracking Gen. Detector Spectrum analyzer	PLL	IC6-1 TP2	PLL	T6–9	Adjust as shown at at right.	 Less than 2dB between peak and point of 37MHz. 37MHz Lipple 3dB or less 2dB 50dB or less 42MHz
13. VCO-3A	1) FREQ : 7,499.9$\boxed{9}$ kHz To obtain this frequency 1st set dial to 7,500.0$\boxed{0}$. Then using mic push button depress DOWN button one step.	DC V.M	PLL	TP1	PLL	T1	2.1V	±0.1V
	2) FREQ : 0,000.0kHz						Check	6.5V or less
14. VCO-3B	1) FREQ : 15,999.9$\boxed{9}$ kHz To obtain this frequency 1st set dial to 16,000.0$\boxed{0}$. Then using mic push button depress DOWN button one step.	DC V.M	PLL	TP1	PLL	T2	2.1V	±0.1V
	2) FREQ : 7,500.0$\boxed{0}$ kHz						Check	6.5V or less
15. VCO-3C	1) FREQ : 22,999.9$\boxed{9}$ kHz To obtain this frequency 1st set dial to 23,000.0$\boxed{0}$. Then using mic push button depress DOWN button one step.	DC V.M	PLL	TP1	PLL	T3	2.1V	±0.1V
	2) FREQ : 16,000.0$\boxed{0}$ kHz						Check	6.5V or less

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specification/Remakrs
		Test equipment	Unit	Terminal	Unit	Part	Method	
16. VCO-3D	1) FREQ : 29,999.9$\boxed{9}$ kHz Turn VFO to frequency stop.	DC V.M	PLL	TP1	PLL	T4	1.6V	±0.1V
	2) FREQ : 23,000.0$\boxed{0}$ kHz						Check	6.5V or less
17. Encoder	1) Remove the VFO knob and motor-drive the encoder at approx. 300 rpm.	Oscillo-scope	Cont	㉓-3				Point C may be located anywhere. When a motor is not available, manually turn the VFO to check the duty ratio.
	2) EN1 duty ratio adjustment : Turn both CW and CCW				Encoder	VR1		After adjusting with the VFO control turned CW, check that intervals D and E are also indentical when the VFO control is turned CCW.
	3) EN2 duty ratio adjustment : Turn in the both directions.			㉓-2		VR2	Adjust until intervals D and E are equal to each other with point C placed at the center.	

RX ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specification/Remarks
		Test equipment	Unit	Terminal	Unit	Part	Method	
1. IF AMP	1) FREQ : 160.0kHz MODE : LSB RF GAIN Control : MAX Use the minimum SSG input possible during alingment.	SSG AF V.M Oscillo-scope AF Dummy load	Rear panel	ANT EXT. SP	RF IF	T8,4–7 10–14 VR2 L1–4	MAX	S/N 10dB or more at –6dBμ input. 1V or more/8Ω at AF GAIN Control MAX.
	2) FREQ : 29,000.0kHz MODE : FM (If FM-430 is installed) SSG : 1kHz audio at 5kHz dev.				FM IF	VR3 T2	MAX	
2. Internal spurious beat	1) FREQ : 500.0kHz RF GAIN Control : Minimum level possible.				RF	VR1	MIN	
3. RX DET Balance	1) RF GAIN Control : MIN	RF VTVM (Oscillo-scope)	IF	TP1	IF	VR1 TC1	MIN	
4. 48.055MHz IF trap	1) FREQ : 24,999.9kHz SSG output : 48.055MHz, 80dB RF GAIN Control : Minimum level as possible	SSG AF V.M	Rear panel	ANT EXT. SP	RF	T1	MIN	70dB or more
5. S meter	1) No signal (SSG output : OFF)	S meter			IF	VR2	Set to starting point. (Meter zero)	
	2) FREQ : 14,175.0kHz MODE : USB SSG output : 14,175.0kHz, 8dB	SSG S meter	Rear panel	ANT		L3	S1 Adjust counter clockwise from peak. (turn slug out).	8.0dB±4dB
	3) SSG output : 40dB					VR3	S9	40dB±6dB
	4) FREQ : 29,000.0kHz MODE : FM SSG output : 29,000.0kHz, 30dB (If FM-430 is installed.)				FM IF	VR2	Full scale	30dB±10dB

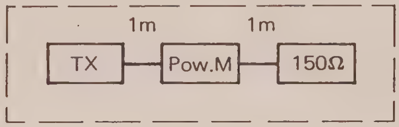
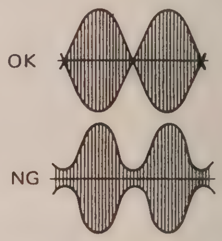
ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specification/Remakrs
		Test equipment	Unit	Terminal	Unit	Part	Method	
6. Squelch threshold	1) MODE : CW NAR/WIDE SW : WIDE SQL control : 12 o'clock	Speaker		EXT. SP	IF	VR4	Adjust VR slowly and stop at threshold.	12 o'clock
7. Noise Blanker	1) FREQ : 14,175.0kHz NB SW : ON SSG output : 14,175.0kHz First adjust 20dB input, then using the minimum input as possible.	SSG DC V.M (Oscilloscope)	Rear panel RF	ANT R82	RF	T15, 16	MIN	
	2) Noise Gen. : Low level	Noise Gen. SP	Rear panel	ANT EXT. SP		T15, 16	MIN noise level.	
8. Beeper	1) AF GAIN control : MIN Jumper connector ⑳ to GND.	AF V.M Oscilloscope AF dummy load		EXT. SP	IF	VR6	50mV/8Ω	

TX ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specification/Remarks
		Test equipment	Unit	Terminal	Unit	Part	Method	
1. IC meter null	1) ALC/IC SW : IC STBY : SEND Disconnect RF and DRV connector. Adjust to minimum current by VR1 and VR2 in Final unit.	S meter			Filter	VR4	Set to S meter "0".	*If this adjustment is performed, step 2.1) Base current must also be performed.
2. Base current	1) MODE : USB MIC LEVEL control : MIN Connect Ammeter ⊕ : EXT power supply ⊕ terminal ⊖ : Power connector ⊕ terminal Adjust to minimum current with VR1 and VR2 in the Final unit. STBY : SEND	Ammeter			Final	VR1	Current drain (Minimum current) +200mA	First adjust VR1 and VR2 for minimum. Adjust VR1 for an increase of 200mA when switched to TX. Then adjust VR2 for 200mA over this reading.
	2) STBY : REC (After adjustment)					VR2	Current drain (Minimum current) + Driver current (200mA)+200mA	
3. TX AMP	1) FREQ : 14,175.0kHz MODE : CW CAR LEVEL control : MAX Disconnect DRV connector from RF unit. Reconnect this connector after adjustment. STBY : SEND	50ΩRF dummy load Oscilloscope	RF	DRV	IF RF	L9 T17–19 VR3, T20–22 VR4,5	MAX	*If this adjustment is performed, step 8. must also be performed. Readjust VR3,4,5 for Min. sprious, step 8).
4. NULL	1) FREQ : 29,900.0kHz MODE : CW CAR LEVEL control : 50–60W output power STBY : SEND	Power meter	Rear panel	ANT	Filter	VR2 TC1	Mechanically set to 9–10 o'clock. MAX	

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specification/Remakrs
		Test equipment	Unit	Terminal	Unit	Part	Method	
5. ALC (RF output power)	1) FREQ : 14,175.0kHz MODE : CW CAR LEVEL control : ALC scale MAX STBY : SEND	Power meter	Rear panel	ANT	Filter	VR1	95W	Caution : In no case should the power be adjusted for greater than 110 watts.
6. Power down	1) FREQ : 28,500.0kHz MODE : CW CAR LEVEL control : ALC scale MAX Connect ACC socket pin ⑥ to GND. STBY : SEND	Power meter	Rear panel	ANT	Filter	VR3	50W	
7. Protection	1) FREQ : 14,300MHz MODE : CW Connect Ammeter ⊕ : EXT power supply ⊕ terminal ⊖ : Power connector ⊕ terminal Adjust at frequency BAND with maximum current drain. Coax. cable to 150Ω dummy load should be 1m long. STBY : SEND	150ΩRF dummy load Ammeter Power neter	Rear panel	ANT	Filter	VR2	30W 	
	2) ANT : OPEN	Am meter						18A or less
8. Spurious	1) FREQ : 21,200.0kHz MODE : CW CAR LEVEL control : ALC scale MAX STBY : SEND	Spectrum analyzer power meter	Rear panel	ANT (Directional coupler)	RF	VR4,5 VR3	MIN/±5.7MHz MIN/±0.36MHz	*If this adjustment is performed, step 3. must also be performed
9. Carrier suppression	1) FREQ : 14,175.0kHz MODES : USB and LSB MIC LEVEL control : MIN STBY : SEND	Oscilloscope	Rear panel	ANT (Directional coupler)	IF	VR8,9	MIN	−40dB or less
10. SSB mode frequency response	1) FREQ : 14,175.0kHz MODES : USB and LSB AG output : Two tone 7mV 300, 2700Hz Set output to 50W using MIC control. STBY : SEND If two tone generator is not available adjust for equal output power at 300, 2700Hz, as measured on wattmeter.	Oscilloscope	Rear panel	ANT (Directioanl coupler)	Cont	TC4 (USB) TC3 (LSB)	Adjust as shown at right.	*If this adjustment is performed, step 9. must also be performed. 
11. FM IF (If FM-430 is installed)	1) FREQ : 29,000.0kHz MODE : FM STBY : SEND	RF VTVM	FM IF	D2 cathode	FM IF	T1	MAX	
12. Deviation (If FM-430 is installed)	1) FREQ : 29,000.0kHz MODE : FM AG output : 1kHz, 20mV STBY : SEND	Linear detector Power meter (50Ω)	Rear panel	ANT (Directional coupler)	FM IF	VR1	5kHz	
	2) AG output : 2mV						Check	3.5kHz or less

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specification/Remakrs
		Test equipment	Unit	Terminal	Unit	Part	Method	
13. IC meter	1) FREQ : 14,175.0kHz MODE : CW CAR LEVEL control : current drain 17.5A Connect Ammeter ⊕ : EXT power supply ⊕ terminal ⊖ : Power connector ⊕ terminal STBY : SEND	IC meter (Power meter)		ANT	Filter	VR5	14A	
14. ALC meter	1) MODE : USB MIC LEVEL control : MIN METER SW : ALC STBY : SEND	ALC meter			IF	VR12	Set to ALC meter starting point.	
	2) FREQ : 14,175.0kHz AG output : 1kHz, 5mV MIC LEVEL control : Set to ALC meter starting point.	Power meter (50Ω)		ANT				
	AG output : +6dB				IF	VR11	Adjust for maximum ALC scale reading.	
15. Speech processor	1) MODE : USB MIC LEVEL control : MIN AG output : 1kHz, 10mV PROC SW : ON and OFF STBY : REC	AM V.M	IF	TP2	IF	VR7	Level should be the same between ON and OFF.	140mV (Reference value)
16. CW side tone	1) MODE : CW AF GAIN control : 12 o'clock VOX SW : MAN STBY : REC Connect KEY to KEY jack and close the key contacts.	AF V.M Oscilloscope AF dummy load	Rear panel	EXT. SP	IF	VR10	0.63V/8Ω	

ADJUSTMENT

MICROPROCESSOR OPERATION CHECK

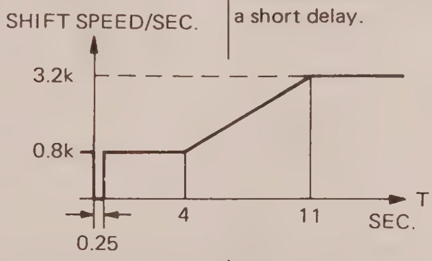
Item	Condition	Operation check
1. Reset check	1) FUNCTION SW : A POWER SW : OFF Set the POWER SW ON while depressing the $\boxed{\text{A=B}}$ key. Then release the $\boxed{\text{A=B}}$ key.	FREQ : 14,000.0kHz MODE : USB VFO A : Lights The "Beeper" sounds simultaneously with POWER ON.
	2) FUNCTION SW : B	FREQ : 14,000.0kHz MODE : USB VFO B : Lights
	3) $\boxed{\text{M.CH}}$ SW : ON M.CH SW : change the channels in 1 through 8 order.	The frequency display disappears. M.CH display lights and displays 1–8 in order.
2. Band	1) $\boxed{\text{M.CH}}$ SW : OFF 1 MHz STEP SW : OFF Depress the "BAND : UP" key once.	FREQ : $\boxed{1}\boxed{8}$,$\boxed{0}$00.0kHz The "Beeper" sounds simultaneously.
	Press repeatedly.	The MHz display □□,□ counts up. The "Beeper" sounds simultaneosly.
	2) Hold the "BAND : UP" on.	FREQ : 14,000.0 18,000.0 ↑ ↓ 10,000.0 21,000.0 ↑ ↓ 7,000.0 24,500.0 ↑ ↓ 3,500.0 28,500.0 ↑ ↓ 1,500.0 29,500.0 The "Beeper" sounds at each Key-press.
	3) Depress the "BAND : DOWN" key once.	FREQ : □□,□00.0kHz Displays 1 MHz lower frequency from that previously displayed in 2). The "Beeper" sounds.
	Repeat the operation.	The frequency display steps down 1 MHz at each key-press. The "Beeper" sounds.
	4) Hold the "BAND : DOWN" key on.	The frequency display in 2) steps down. The "Beeper" sounds at each key-press.
	5) 1 MHz STEP SW : ON Hold the "UP" key on.	FREQ : □□,000.0kHz The MHz display □□ advances 1 MHz at each key-press.
	Hold the "DOWN" key on.	The display steps down 1 MHz at each key-press.

Item	Condition	Operation check
3. Dial	1) FREQ : 0,000.0kHz ① Check to see if the display does not change by turning the VFO control counterclockwise. And adjust the index by turning it in the same way. ② Turn the VFO control slowly clockwise. $\boxed{\text{STEP}}$ SW : OFF	One revolution of VFO is 9.5–10kHz.
	2) $\boxed{\text{STEP}}$ SW : ON	One revolution of VFO is is 95–100kHz.
4. Memory write	1) FREQ : 14,000.0kHz MODE : USB M.CH SW : 1 $\boxed{\text{M.IN}}$ SW : ON	The "Beeper" sounds when "M.IN" key is depressed.
	2) M.CH SW : 6 $\boxed{\text{M.IN}}$ SW : ON	
	3) FREQ : 14,010.0kHz M.CH SW : 7 $\boxed{\text{M.IN}}$ SW : ON	
	4) M.CH SW : 8 $\boxed{\text{M.IN}}$ SW : ON	The "Beeper" sounds continuously when "M.IN" key is depressed.
	5) FREQ : 14,020.0kHz M.CH SW : 8 $\boxed{\text{M.IN}}$ SW : ON	The continuous tone stops when the "M.IN" key is depressed.
	6) FREQ : 7,000.0kHz MODE : LSB M.CH SW : 2 $\boxed{\text{M.IN}}$ SW : ON	The "Beeper" sounds when the "M.IN" key is depressed.
	7) FREQ : 21,000.0kHz MODE : CW M.CH SW : 3 $\boxed{\text{M.IN}}$ SW : ON	
	8) FREQ : 24,500.0kHz MODE : AM M.CH SW : 4 $\boxed{\text{M.IN}}$ SW : ON	
	9) FREQ : 29,500.0kHz MODE : FM M.CH SW : 5 $\boxed{\text{M.IN}}$ SW : ON	

Item	Condition	Operation check	
5. Memory recall (1)	1) $\boxed{\text{M.CH}}$ SW : ON STBY SW : REC	"M.CH" display lights.	
		FREQ.	MODE
	M.CH SW : 1	14,000.0kHz	USB
	2	7,000.0kHz	LSB
	3	21,000.0kHz	CW
	4	24,500.0kHz	AM
	5	29,500.0kHz	FM
	6	14,000.0kHz	USB
	7	14,010.0kHz	USB
	2) M.CH SW : 8 STBY SW : REC	FREQ : 14,010.0kHz USB	
	STBY SW : SEND	FREQ : 14,020.0kHz USB	

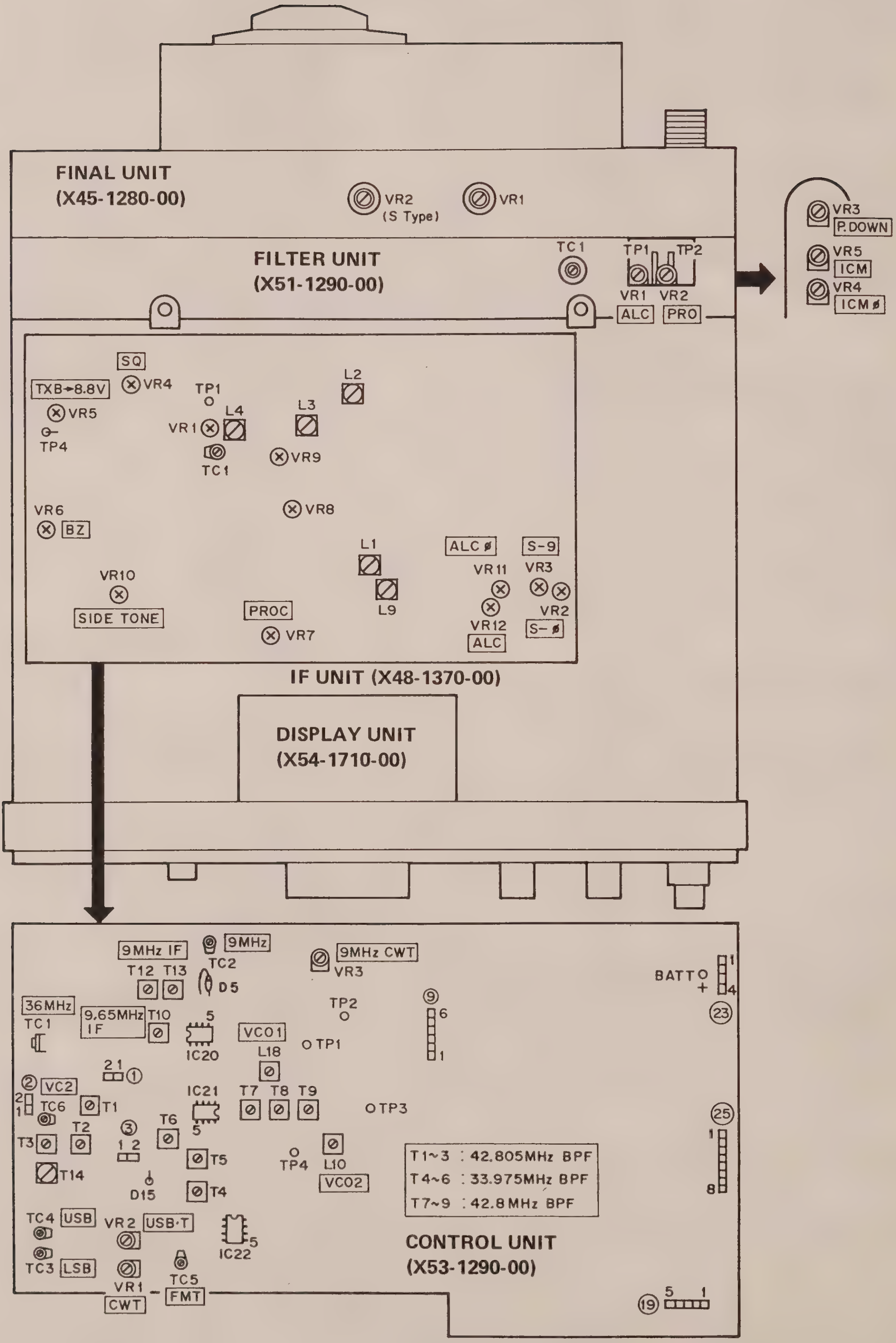
ADJUSTMENT

Item	Condition	Operation check
6. Memory recall (2)	1) M.CH SW : 1 MR SW : ON	FREQ : 14,000.0kHz The "Beeper" sounds.
	2) Turn the VFO both clockwise and counterclockwise.	The display shows normal frequency control.
	3) MR SW : ON	FREQ : 14,000.0kHz The tone sounds simultaneously.
7. Memory erase	1) M.CH SW : 8 STBY : REC Place the M.IN SW : ON While depressing either UP or DOWN BAND SW key.	The frequency display clears after the BAND and M.IN SW keys are released. The "Beeper" sounds.
8. Memory scan	1) MS SW : ON	M.CH : →1→2→3→4 7←6←5← Displays the frequencies and modes in Item 5. 1).
9. Program scan	1) MS SW : OFF PG.S SW : ON PG. SCAN SPEED Pot. : MIN.	The scan starts from M.CH : 6 (FREQ : 14,000.0kHz) to M.CH : 7 (FREQ : 14,010.0kHz). When the frequency reaches 14,010.0kHz, the scan returns to 14,000.0 kHz and starts again. The scan speed is approx. 500Hz/sec. The "Beeper" sounds at the start and at return to the starting frequency.
	PG. SCAN SPEED Pot. : MAX	The scan speed is approx. 2.5kHz/sec. (five times faster then MIN).
	2) HOLD SW : ON	The scan stops
	Turn the VFO clockwise.	The scan repeats within the preset range from M.CH : 6 → M.CH : 7 The "Beeper" sounds at the start and at return to the starting frequency.
	Turn the VFO counterclockwise	The scan stops at the frequency preset in M.CH : 6.
	3) HOLD SW : OFF	The scan resumes from the displayed frequency.

Item	Condition	Operation check
10. A=B (Function)	1) MS SW : OFF PG.S SW : OFF M.CH SW : OFF FUNCTION : B FREQ : 7,000.0kHz MODE : LSB	"VFO B" display lights.
	FUNCTION : A FREQ : 14,000.0kHz MODE : USB	"VFO A" display lights.
	2) FUNCTION : A A=B SW : ON FUNCTION : B	FREQ : 14,000.0kHz MODE : USB FREQ : 14,000.0kHz MODE : USB
11. UP/DOWN (Microphone)	1) Connect a microphone (MC-60A or MC-42S). Momentarily depress the "UP" key several times.	When the 100Hz digit changes, the 100Hz upper frequency is displayed after ten key-presses.
	2) Hold the "UP" key on.  	The frequency continuously advances forward after a a short delay.
	3) Momentarily depress the "DOWN" key.	When the display of 100Hz range changes, the 100Hz lower frequency is displayed after ten key-pressed.
	4) Hold the "DOWN" key on.	The frequency continuously advences backward after a short delay.
12. Lock	1) LOCK SW : ON Turn the VFO both clockwise and counter-clockwise.	The frequency displayed at lock does not change.
	2) Depress both BAND UP and DOWN keys.	
	3) Hold the microphone (MC-60A or MC-42S) "UP" and "DOWN" key on.	

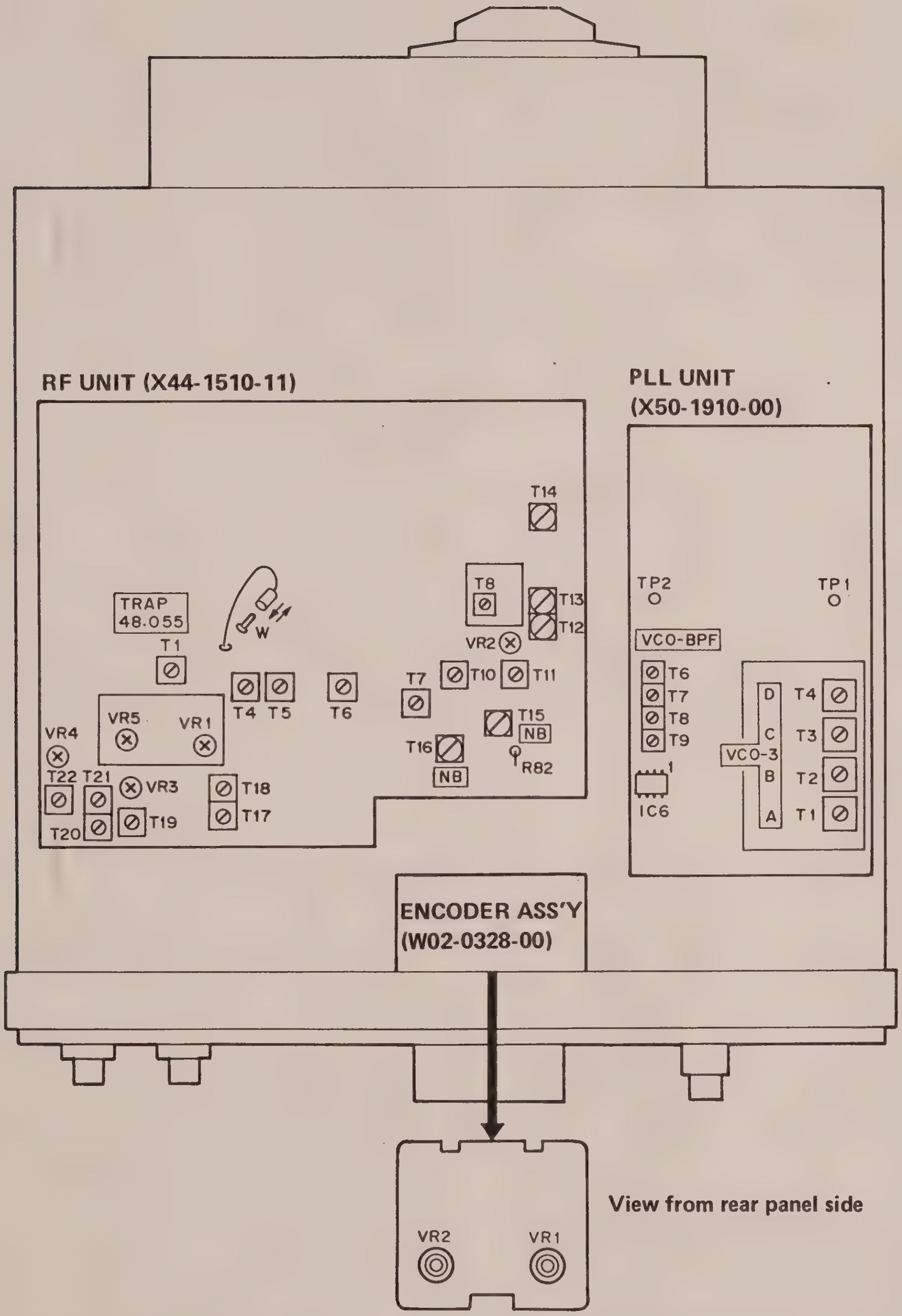
ADJUSTMENT

TOP VIEW



ADJUSTMENT

BOTTOM VIEW



LEVEL DIAGRAM

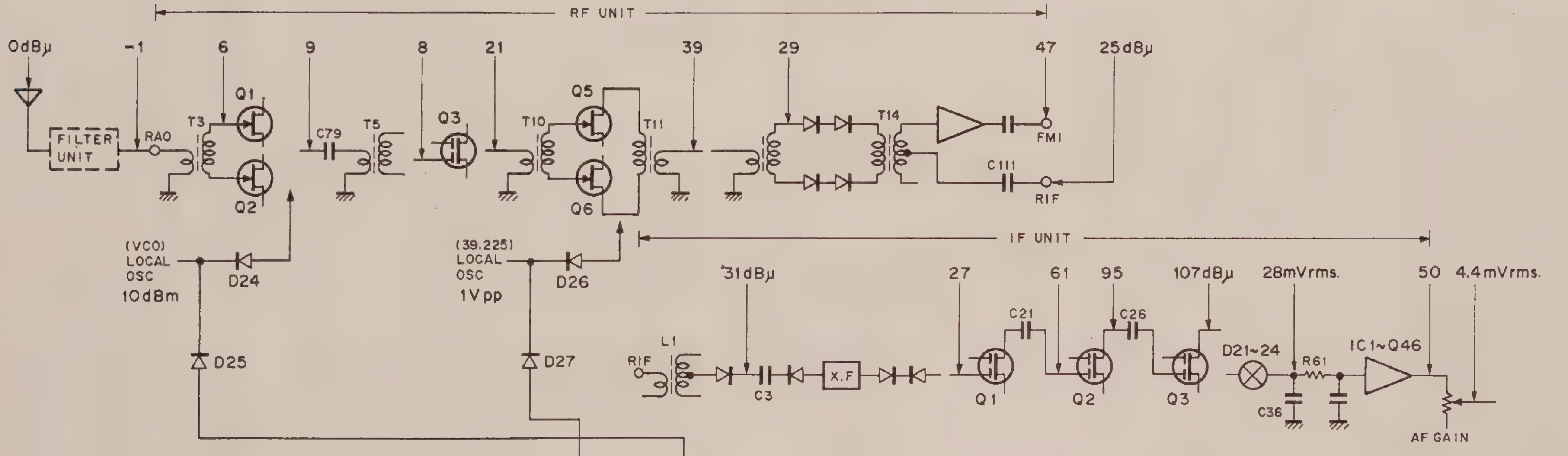
RX SECTION

FREQUENCY : 14.200MHz
INPUT : 0dBμ
AF OUTPUT : 0.63V at 8Ω

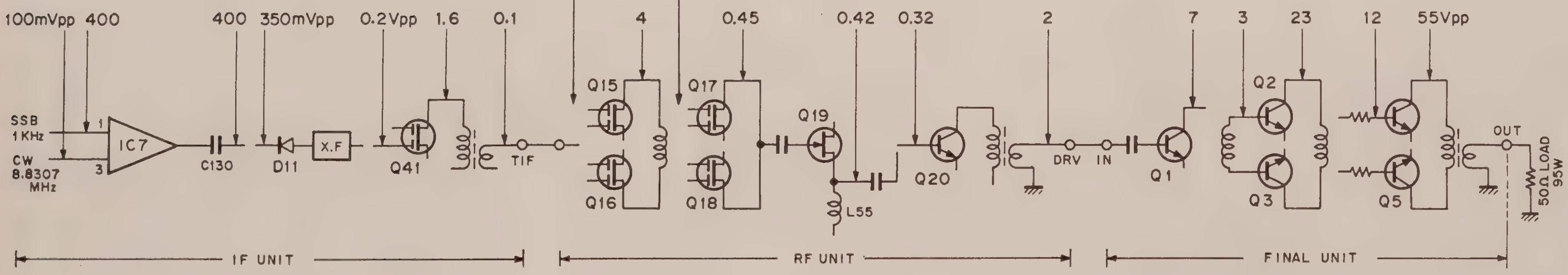
NOTES

1) The figures shown are signal generator output required for a constant audio output with a constant AF gain control setting. Set the AF gain control for 0.63V/8Ω (50mW) audio output at 0dB signal generator input at 14.200MHz.

2) To measure signal generator output connect a 0.01μF 500WV capacitor between the signal generator and the check point.



TX SECTION

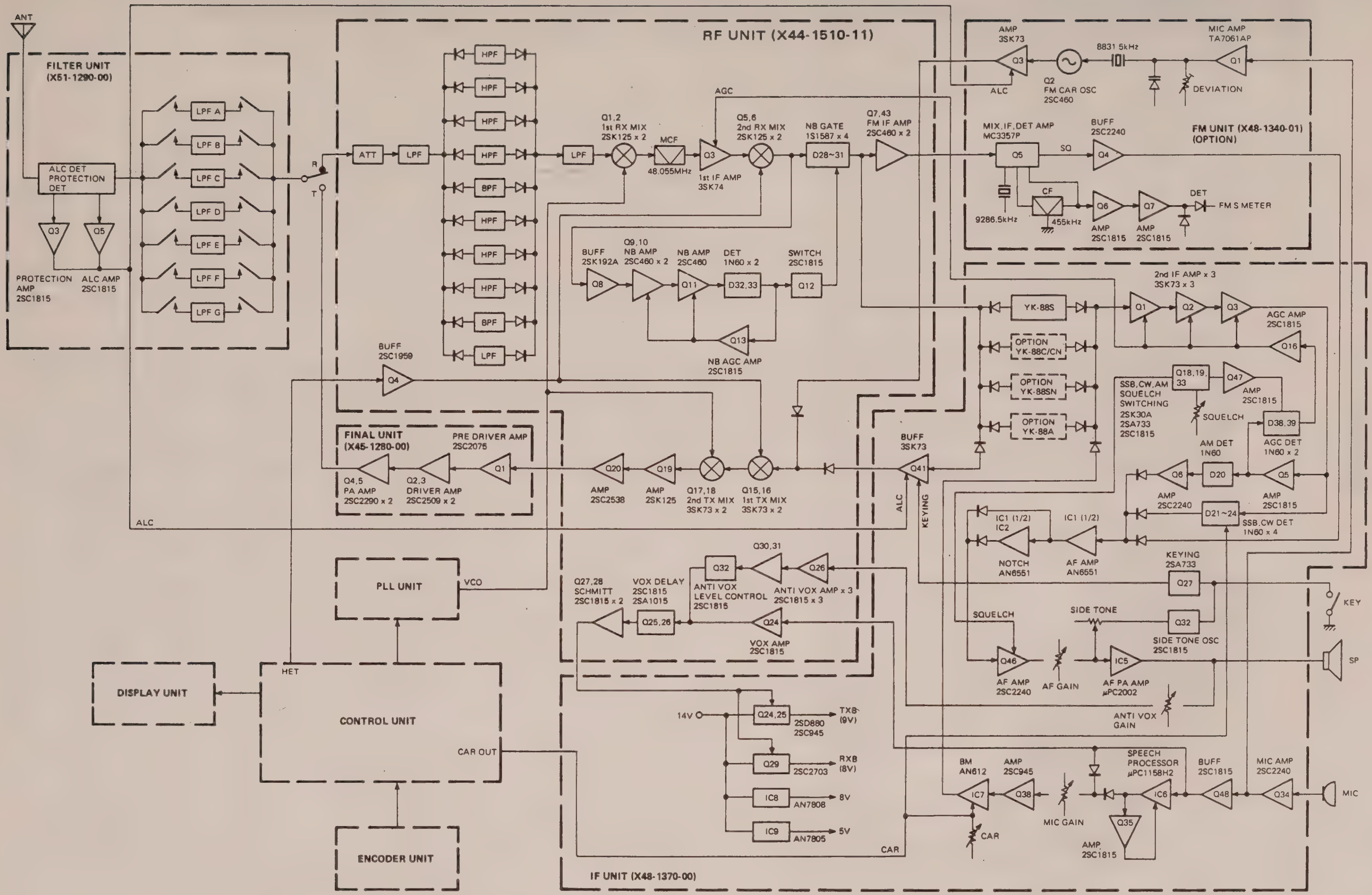


FREQUENCY : 14.200MHz
AF INPUT
SSB : 1kHz,400mVpp to IC7 1pin.
CW : 8.8307MHz, 100mVpp to IC7 3pin.

NOTES

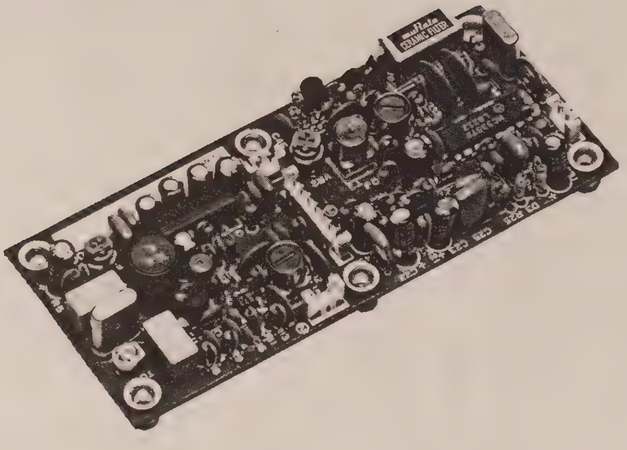
1) Adjust ALC level control for full scale reading.

BLOCK DIAGRAM



FM-430

OUTSIDE VIEW



PARTS LIST

SEMICONDUCTOR

N : New parts

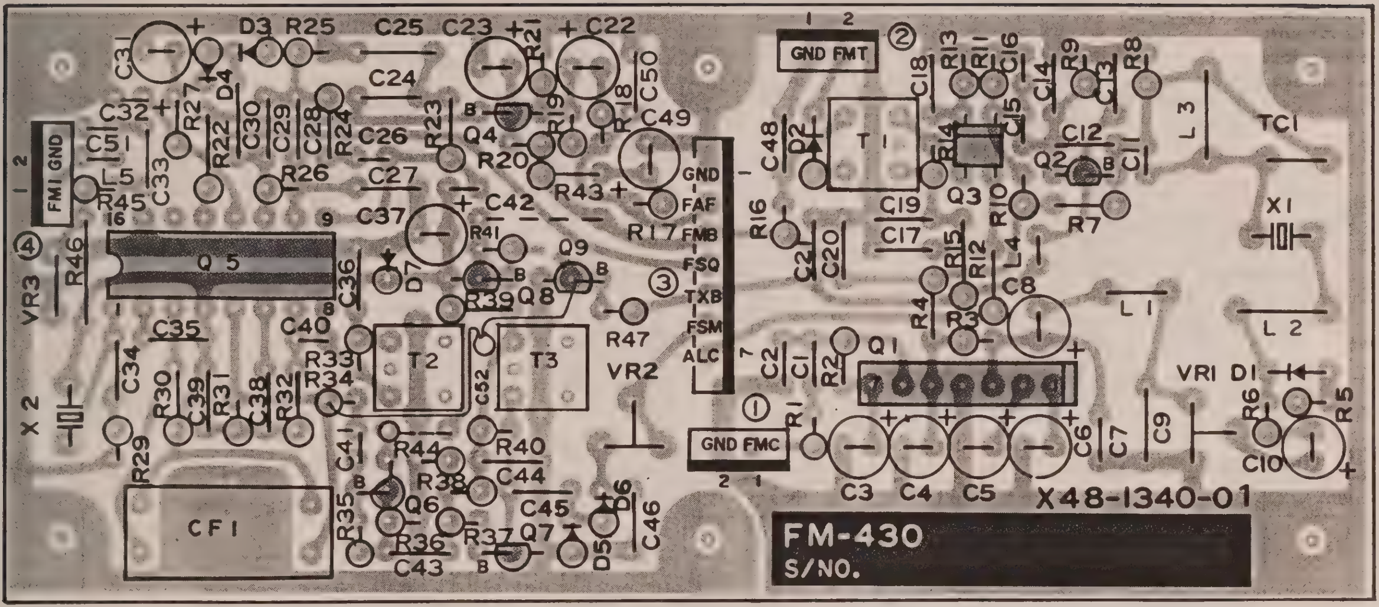
Item	Re-marks	Name	Item	Re-marks	Name
Diode		1N60	**FET**		3SK73(GR)
		1S1555			
		1S2208	**IC**		MC3357P
Zener diode		WZ-071			TA7061AP
TR		2SA1015(Y)			
		2SC460(B)			
		2SC1815(Y)			
		2SC2240(GR)			

Part No.	Re-marks	Description	Ref. No.
FM-430 GENERAL			
B50-4029-00	N	Instruction manual	
H01-4471-13	N	Packing carton (inside)	
H12-0483-04		Cushion	
H25-0029-04		Protective bag, Screw	
H25-0120-04		Protective bag, Unit	
J61-0401-05		Nylon band x 4	
N87-3012-46		Self tapping screw x 6	
X48-1340-01	N	FM unit	

Part No.	Re-marks	Description	Ref. No.	Q'ty
FM UNIT (X48-1340-01)				
C05-0031-15		Ceramic trimmer 10P	TC1	1
CC45SL1H050C		C 5P	C15	1
CC45SL1H101J		C 100P	C29	1
CC45SL1H120J		C 12P	C40	1
CC45SL1H121J		C 120P	C34	1
CC45SL1H150J		C 15P	C51	1
CC45SL1H220J		C 22P	C16,41	2
CC45SL1H221J		C 220P	C12,14	2
CC45SL1H560J		C 56P	C35	1
CC45SL1H680J		C 68P	C27,28	2
CC45UJ1H070D		C 7P	C11	1
CE04W1A101M		E 100 10V	C37	1
CE04W1A220M		E 22 10V	C4,23	2
CE04W1A470M		E 47 10V	C3,6	2
CE04W1E4R7M		E 4.7 25V	C49	1
CE04W1H010M		E 1 50V	C5,8,10,22,31	5
CK45B1H102K		C 0.001	C26,45	2
CK45B1H152K		C 0.0015	C42	1
CK45F1H103Z		C 0.01	C13,17,20,21,33,36,43,46	8
CK45F1H223Z		C 0.022	C18,19,44,48	4
CK45F1H473Z		C 0.047	C38,39	2
CQ92M1H103K		ML 0.01	C2,7,24	3
CQ92M1H333K		ML 0.033	C50	1
CQ92M1H393K		ML 0.039	C9	1
CQ92M1H472K		ML 0.0047	C1	1
CQ92M1H473K		ML 0.047	C25,30	2
CS15E1C2R2M		T 2.2 16V	C32	1
E40-0273-05		Mini connector 2P		3
E40-0773-05		Mini connector 7P		1
J31-0502-04		PC board collar		6
J42-0428-05		PC board bushing		6
L30-0199-06		Tuning coil	T3	1
L30-0503-05		Tuning coil	T2	1
L34-0535-05		Tuning coil	T1	1
L33-0639-05		Choke coil 10μH	L3	1
L33-0640-05		Choke coil 12μH	L2	1
L40-1511-03		Ferri-inductor 150μH	L4	1
L40-1541-27		Ferri-inductor 150mH	L1	1
L40-6891-01		Ferri-inductor 6.8μH	L5	1
C72-0309-06		Ceramic filter CFT455F2	CF1	1
C77-0939-05		Crystal 9.2865MHz	X2	1
C77-0940-05		Crystal 8.8315MHz	X1	1
R12-3430-05		Trim. pot. 10kΩ(B)	VR1	1
R12-4408-05		Trim. pot. 50kΩ(B)	VR2	1
R12-4410-05		Trim. pot. 50kΩ	VR3	1
R92-0150-05		Short jumper		2

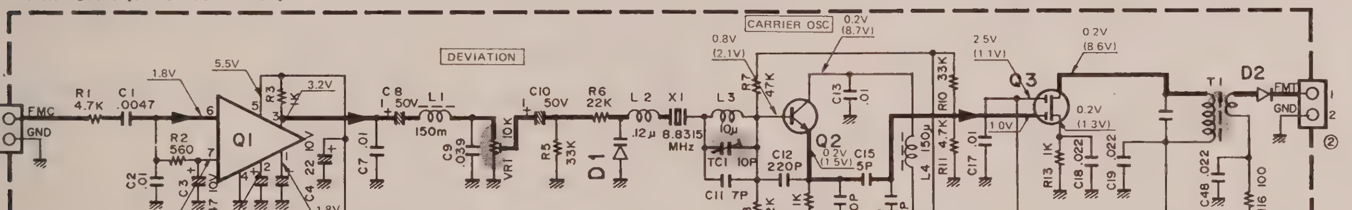
FM-430

PC BOARD VIEW



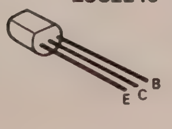
SCHEMATIC DIAGRAM

FM UNIT(X48-1340-01)

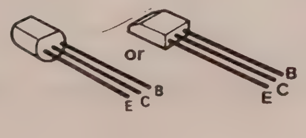


Q1	: TA7061AP	Q5	: MC3357P	D1	: IS2208
Q2	: 2SC460(B)	Q6	: 2SA1015(Y)	D2	: IS1555
Q3	: 3SK73(GR)	Q7～9	: 2SC1815(Y)	D3～6	: IN60
Q4	: 2SC2240(GR)			D7	: WZ071

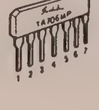
2SA1015 2SC1815
2SC2240



2SC460



TC7061AP



PS-430

SPECIFICATIONS

Input voltage:	120/220/240V AC±10%, 50/60Hz
Output voltage:	13.8V DC (standard voltage)
Output current:	20 A (25% duty cycle) 15A (50% duty cycle)
Continuous load current:	10 A max. (including external output terminal)
Output voltage fluctuation:	Within ±0.7 V at AC 120V, 220V, 240V±10% (Load current: 15A) Within 0.7 V between 2–15 A load. (No-load output voltage: Less than 16V at 120V/220/240V. AC)
Ripple voltage.	Less than 20 mV (rms) at 13.8V, output current 15A.
Power consumption:	Approx. 480 W (at 120/220/240V AC. 13.8V DC, 20A)
Dimensions:	173 (6-13/16) W x 95 (3-3/4)H x 245 (9-5/8) D mm (inch)
Weight:	Approx. 7 kg (15.4 lbs.)

PARTS LIST

SEMICONDUCTOR

N : New-parts

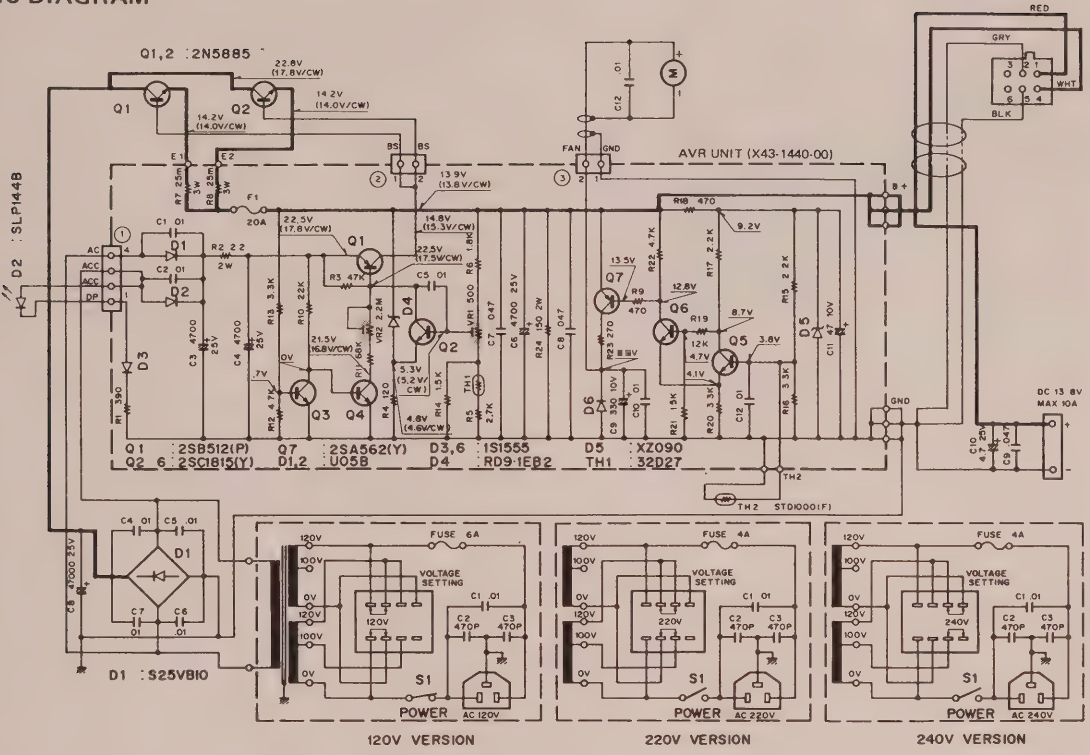
Item	Re-marks	Name	Item	Re-marks	Name
Diode		1S1555	**Thermistor**		32D27
		S25VB10			SDT1000(F)
		U05B	**TR**		2N5885
					2SA562(Y)
Zener diode		RD9.1EB2			2SB512(P)
LED		SLP144B			2SC1815(Y)

Part No.	Re-marks	Description	Ref. No.
		PS-430 GENERAL	
A01-0937-02	N	Case (upper)	
A01-0938-12	N	Case (lower)	
A20-2461-13	N	Panel K,M,W,X	
A20-2462-03	N	Panel T	
B39-0407-04		Spacer x 2	
B40-2634-04	N	Name plate	
B41-0626-14	N	Voltage sheet 120V K	
B41-0627-14	N	Voltage sheet 220V M,W	
B41-0630-04	N	Voltage sheet 240V T,X	
B42-1733-14		Voltage sheet	
B42-1770-04	N	Current indication sheet M,T,W,X	
B46-0404-00		Warranty card K	
B50-4014-10	N	Instruction manual K,M,W,X	
B50-4015-00	N	Instruction manual T	
CE04W1E4R7M		E 4.7 25V	C10
CK45E2H103P		C 0.01 500V x 4	C4–7
CK45F1H473Z		C 0.047 x 2	C9,11
C90-0865-05	N	E 47000 25V	C8
C91-0079-05		C 0.01	C1
C91-0496-05		C 470P x 2	C2,3
E18-0351-05		3P Inlet	
E20-0282-05		2P terminal plate	
E22-0472-05		Lug plate	
E23-0015-04		GND lug	
E23-0425-05		Lug terminal	
E30-1643-15		AC cord K,M	
E30-1644-15		AC cord T	
E30-1645-05		AC cord W	
E30-1647-05		AC cord X	
E31-0500-05		Cable with plug	
F01-0786-03	N	Heat sink plate	
F01-0787-13	N	Heat sink	
F05-4022-05		Fuse 4A K	
F05-4022-05		Fuse 4A x 2 M,T,W,X	
F05-6021-05		Fuse 6A x 2 K	
F05-6021-05		Fuse 6A M,T,W,X	
F07-0847-04	N	Fan cover	
F09-0405-24		Fan	
H01-4451-14	N	Packing carton (inside) K,M,W,X	
H01-4452-04	N	Packing carton (inside) T	
H10-2567-02	N	Packing fixture (F)	
H10-2568-02	N	Packing fixture (R)	
H12-1319-04	N	Cushion	
H20-1420-03		Protective cover	
H25-0105-04		Protective bag	
J02-0323-05		Foot x 2	
J02-0427-04	N	Assistant foot	
J13-0033-15		Fuse holder	
J42-0403-05		Cord bushing	
J42-0095-05	N	Rubber bushing x 3	
K29-0758-04		Push knob	
L01-8166-25	N	Power transf.	
S29-2406-05		Voltage selector switch	S2
S40-1405-05	N	Power switch	S1
T42-0301-05		Fan motor	
X43-1440-00	N	AVR unit	

Part No.	Re-marks	Description	Ref. No.	Q'ty
		AVR UNIT (X43-1440-00)		
CE04W1A331M		E 330 10V	C9	1
CE04W1A470M		E 47 10V	C11	1
CK45F1H103Z		C 0.01	C1,2,5	3
CK45F1H473Z		C 0.047	C7,8	2
C90-0814-05		E 4700 25V	C3,4,6	3
E23-0022-04		Terminal		8
E23-0046-04		Square terminal		2
E40-0273-05		Mini connector 2P		2
E40-0473-05		Mini connector 4P		1
F05-2035-15		Fuse 20A		1
J31-0502-04		PC board collar		4
J42-0428-05		PC board bushing		4
R12-0427-05		Trim. pot. 500Ω (B)	VR1	1
R12-8404-05		Trim. pot. 2.2MΩ (B)	VR2	1
RS14GB3D2R2J		MF 2.2Ω 2W	R2	1
R92-0663-05	N	Cement 0.025Ω 3W	R7,8	2

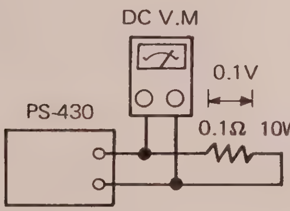
PS-430

SCHEMATIC DIAGRAM



ADJUSTMENT

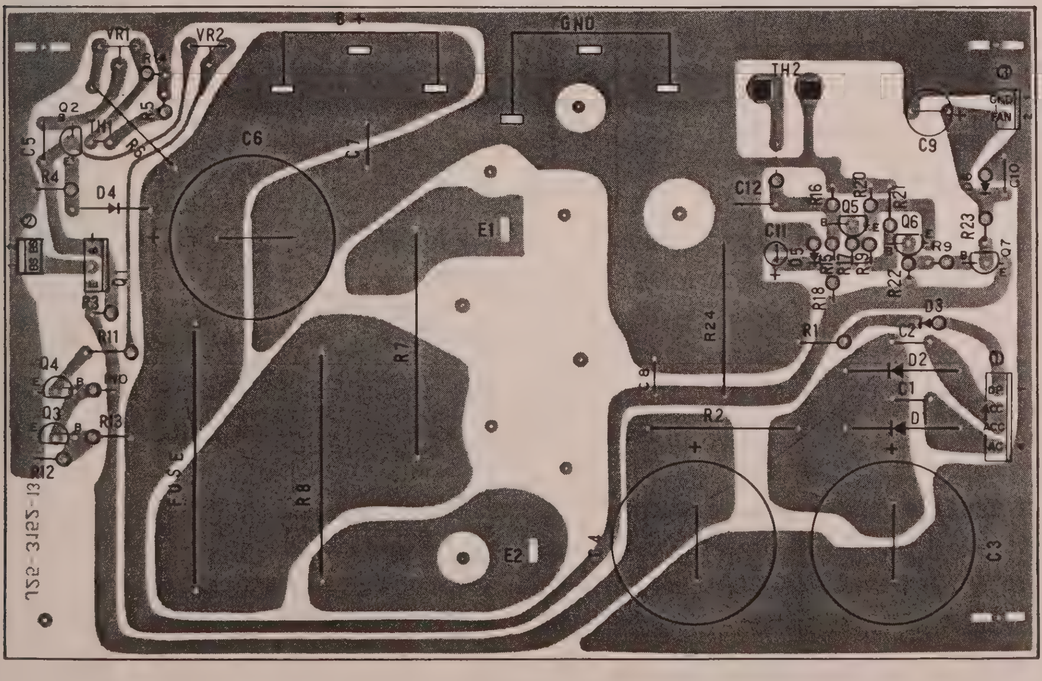
1. Connect the load and set the current to 15A.
2. Adjust output voltage to 13.8V ± 0.4V with VR1.
3. Protection circuit



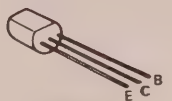
Connect a 0.1Ω 10W resistor and adjust VR2 so that 0.1V DC is obtained.

PC BOARD VIEW

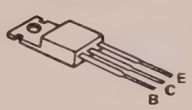
AVR UNIT (X43-1440-00) **Component side view**



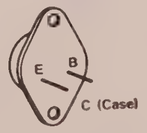
2SC1815



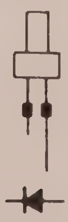
2SB512



2N5885

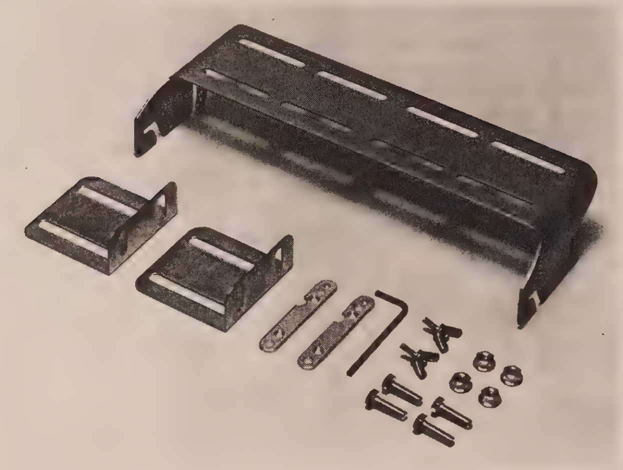


SLP-144B



MB-430/SP-430

MB-430 OUTSIDE VIEW



SP-430 SPECIFICATIONS

SPEAKER SIZE	3"
RATED INPUT	1.0 watts
IMPEDANCE	8 ohms
FREQUENCY RESPONSE	300 Hz to 5 kHz
DIMENSIONS	4-7/8" wide x 3-3/4" high x 9-1/3" deep (excluding feet)
WEIGHT	3.1 lbs.

SP-430 PARTS LIST

N : New parts

Part No.	Re-marks	Description	Ref. No.
A01-0942-03	N	Case (B)	
A01-0944-13	N	Case (A)	
A20-2468-03	N	Panel **K,M**	
A20-2469-03	N	Panel **T**	
A23-1431-04		Rear panel	
B04-0406-04	N	SP grill	
B07-0613-14		SP ring	
B39-0407-04		Spacer x 2	
B46-0404-00		Warranty card **K**	
B50-4026-10	N	Instruction manual **K,M**	
B50-4027-00	N	Instruction manual **T**	

MB-430 PARTS LIST

N : New parts

Part No.	Re-marks	Description	Ref. No.
A13-0635-03	N	Angle	
B50-4016-00	N	Instruction manual	
H01-4453-13	N	Packing control (inside) **M**	
H01-4454-13	N	Packing control (inside) **T**	
H25-0077-04		Protective bag	
H25-0098-04		Protective bag 150 x 480	
J30-0521-04	N	Spacer x 2	
N09-0007-05		Wing bolt x 5	
N09-0008-04		Hex. screw x 6	
N14-0009-04		Nut x 6	
N15-1060-46		Flat washer x 6	
N16-0060-46		Spring washer x 6	
N32-3006-46		Flat screw x 4	
N99-0309-04	N	Hex. head screw x 6	
W01-0401-04		Hex. wrench	

Part No.	Re-marks	Description	Ref. No.
E20-0208-04		Terminal plate	
E30-1629-15		SP cord	
G53-0507-04		Packing x 4	
H01-4468-14	N	Packing carton **K,M**	
H01-4469-04	N	Packing carton **T**	
H10-2513-02		Packing fixture (F)	
H10-2514-12		Packing fixture (R)	
H12-0445-04		Cushion	
H20-1407-03		Protective cover	
H25-0077-03		Protective bag Accessory	
J02-0323-05		Foot x 4	
J02-0409-04		Assistant foot	
J21-1144-14		SP mounting hardware x 2	
J21-2573-04		Foot mounting hardware x 2	
J61-0019-05		Vinyle tie	
N15-1030-46		Washer x 8	
N30-3008-46		Round screw x 4	
N35-3006-41		Bind screw x 12 Case	
N87-3006-46		Self tapping screw x 6	
N87-3008-46		Self tapping screw x 4	
T07-0224-05	N	Speaker	

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International Radio, Inc.

TRIO-KENWOOD
TS-430 USERS
SUPPLEMENT

Published by International Radio, Inc.,

This Supplement is a compilation of articles extracted from the I.R.I. Trio-Kenwood Newsletters published ten times a year.

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(Note: Filters and Kits described on Pages 7 and 9 may be ordered direct from I.R.I. For your convenience, Order Form on Page 30.)

TS-430 TS-930S IRI COMMENTS

The new TS-430S nor the TS-930S do not have a true frequency counter type display as the TS-820-830 which read actual Transmit-Receive frequencies. In fact, it has a display which will not move once dialed in even if the receive frequency changes. ICOM has used this scheme in their IC-701-720-730-740 HF radios for the last five years or so. To have this type of readout, you must have a very little drift in the radio oscillators, and that's exactly what Trio-Kenwood has done in the TS-930S and TS-430S. They both use Master Clocks that are very stable. The Master Clock output is divided down to provide the proper control frequencies. Several TS-930S have showed les than 3 or 4 Hz drift on the 3.5 MHz band; however, on the 28 MHz band, the drift becomes approximately ten times or 30 to 40 Hz, still incredibly stable! The TS-430 is also outstanding regarding stability, not quite as good as the TS-930 but close; 10 Hz on 3.5 MHz and 100 Hz on the 28 MHz band. Both the 430 and 930 show virtually no drift after they are on for one hour. Kenwood TS-430S brochure includes a chart showing stability for the TS-430S that more than likely is in error because it shows about 25 Hz after 20 minutes and no change after 180 minutes. Wouldn't that be something?? After enabling the 930-430 for general coverage transmit, the transmitters terminated into a dummy load, make excellent Signal Generators with outstanding stability, and a 10 Hz digital display to boot. This equipment will rival any other Signal Generators that you have in the shack.

The 430 brochure also shows a Dynamic Range chart which shows the Intercept point to be +12 dBM, the dynamic range to be 100 dBM and the noise floor to be -138 dBM. How's that for specifications!!

I recently purchased a TS-430S, #3060437 and so far have found it to be extremely versatile. The one feature we found disappointing was the Noise Blanker. In my automobile with electronic ignition, the Blanker did nothing when I turned it on for the first time! However, I was able to optimize its performance in the car (engine running) by removing the bottom cover of the 430 and adjusting T15 and T16 for minimum noise and lowest average S-meter reading in CW mode (fast AGC). My noise level went from S-9 down to S-7. I have also wired in two Fox Tango filters, one 1.8 kHz for SSB and one 250 Hz for CW. (A 400 Hz CW filter is also available.) (International Radio Inc. now has available excellent SSB and CW filters to replace the Fox Tango filters.) They both are a must. I don't know what I would have done on the Kenwood Net without that 1.8 kHz filter! You can order the IRI filters with instructions at $49.99 each plus $5.00 shipping and handling. Master and Visa welcome.

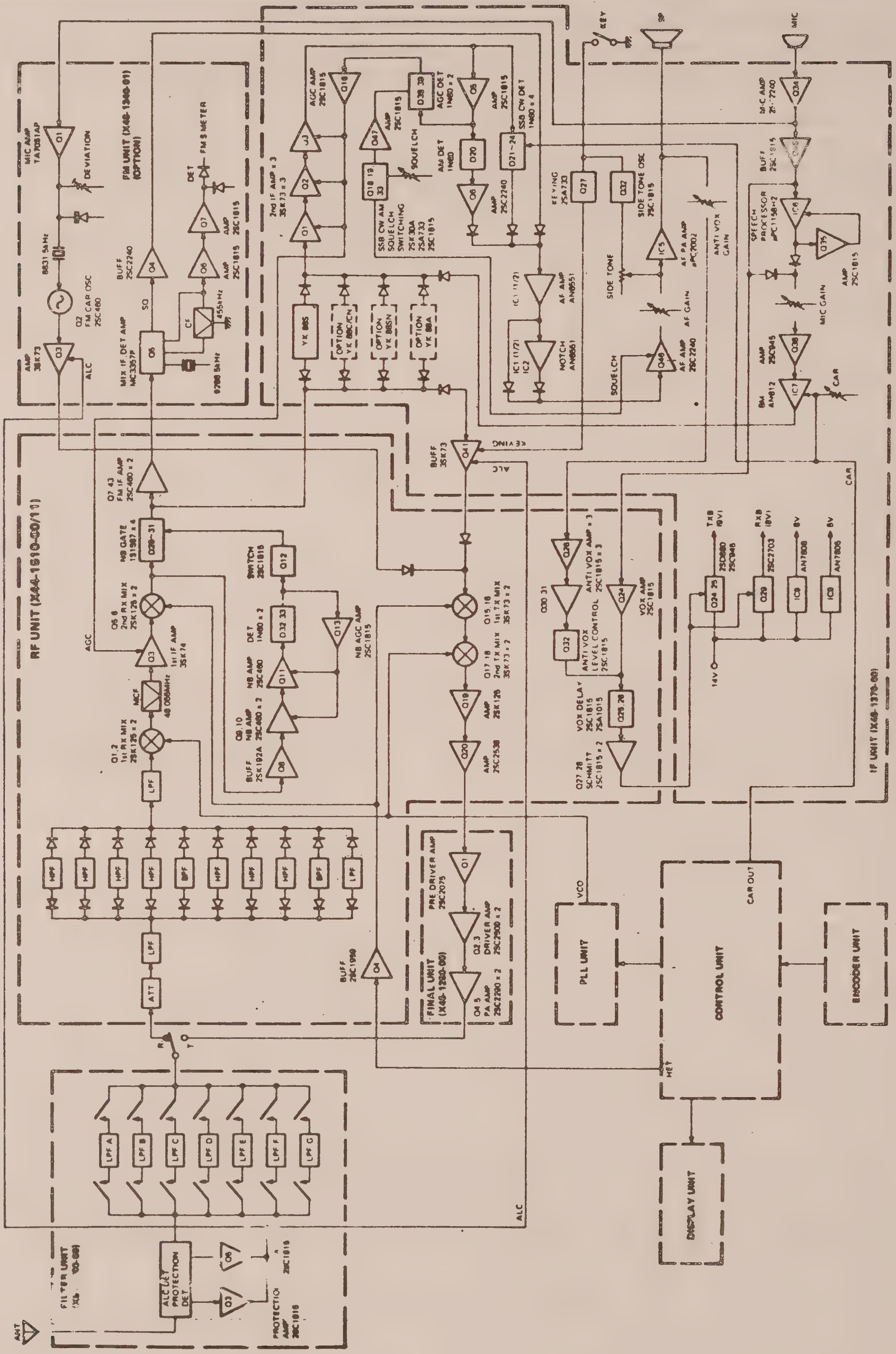
We also have a very interesting Cascading mod coming up in the next Newsletter for the 430 that will add 8 more poles of crystal filtering. This mod will increase the MDS to about 142 dBM and greatly improve the overall selectivity.

The PS-430S is absolutely the smallest high current power supply we have ever seen. It's small, relatively lightweight and has a thermostatic controlled fan, detachable line cord.
We loaded it down with the 430 in CW mode to 100W RF output and the DC voltage output voltage on the PS-430 hardly changed at all. The PS-430 is a real charmer!

The Operator's Manual for the TS-430 is barely adequate for the technically minded amateur. It contains no circuit descriptions but the diagrams are large and clear. There is an Addendum to the Manual (a single sheet) and some Manuals (like mine) did not come with the corrections, some pictorials are labeled for the TS-930S, etc. The Rear Conn. show wrong pin outs, etc. I would certainly make it a point to obtain the Addendum at the time of purchase. Finally, a Service Manual is available from your Dealer or Trio-Kenwood for $10.00 plus $2.50 shipping and handling. It contains 55 pages and a large fold-out schematic of the complete radio. The Manual also covers the FM-430, MB-430, SP-430 and the PS-430. The Circuit descriptions are brief but adequate.

One closing thought, the PS-30 can plug right up to the TS-430S and is actually a Heavy Duty supply compared to the PS-430S. The PS-430 is rated at a 25% duty cycle whereas the PS-30 is 50%. (Thanks, IRI LABS)

TS-430 BLOCK DIAGRAM



TS-430 REVIEW

I am writing this evaluation not as a thorough technical one, but as a subjective user's impression. Also, reports from other TS-430S owners met on the air are included here. My test set-up is as follows:

TS-430S, PS-430, FM-430 unit installed, MC-42S Mic, SP-230 speaker
TS-830S (with 2.1 FT filters), MC-50 Mic, SP-230 speaker
Antenna was the HyGain TH7DXX tri-bander and B and W Vertical for 80 and 40. I did side-by-side comparisons between the 830 and the 430.

OVERALL IMPRESSIONS:

The TS-430 is a very nice rig. It is very easy to use. It seems to be human engineered well and rugged enough for mobile use. Installation of the FM-430 unit was very easy, although VRI and VR2 (for Deviation and FM S Meter gain) needed adjustment. There is an extra digit on the display for 10 Hz resolution. The Manual describes which jumper to cut to enable this option. The two VFO's and memories are well thought out and useful for split operations, such as 10 Meter FM repeaters. Overall frequency stability is excellent. No drift was noted after 10 min. warmup. On the negative side, there were several minor problems:

1. I missed the calibrator control (there is an internal switch for this).
2. Main tuning knob didn't "free-wheel" enough for my taste.
3. Fan on the rig was noisy (other 430 ops. did not notice this).
4. PS-430 power supply is rated 20 amps at 25% duty cycle. I would prefer to have a little more reserve.

TX COMMENTS:

On-the-air reports, as well as oscilliscope readings, were all very positive. The CW note is shaped well and produces a nice note. SSB was up to the usual Kenwood Hi-Fi sound. AM reports were favorable also. After adjusting the deviation on FM to 10 kHz, the reports were favorable. CW power out was 110 watts (measured with a DAIWA 620B power meter), FM power out was 40 watts (the 430S reduces input power in FM mode). AM output power was 50 watts. There is a discrepancy in AM power input specification and the procedure for adjusting AM power. The spec says 60W input while the adjustment procedure gives you 100W input. Harmonic attenuation seems very good. There was less noticeable TV1 on the 430 than on the 830.

Some CW operators will find the VOX delay too short for slow sending speeds. This is true of the 830 also. It was relatively easy to produce distorted audio with a high impedance, high output Mic (the Manual warns of this). One other comment regarding SSB power output, on my 830S the Power Meter (DAIWA 620B) "kicked up" to approximately 100 watts on voice peaks. The 430S only brings up the meter to 40 or 50 watts on voice peaks. I don't fully understand why this happens (several other 430 ops also noted this). Continuous two-tone output was 100 watts, however,

RX COMMENTS:

The general coverage receiver is excellent. All modes, except FM, are dual conversion with IF's at 48 MHz and 8.83 MHz. FM has a third IF at 455 kHz. Sensitivity appeared to be equivalent to the 830S. Dynamic range seems to be better than the 830S. The NB appeared not to degrade this. I rarely experienced overload from strong signals nearby. Selectivity was not as good, of course, as the 830 with 2.1 kHz FT filters. A VBT control would be nice, but I found that I really didn't miss it. The notch is extremely deep and effective. It is an AF notch, however, and IF AGC action can still swamp a weak signal. The all mode squelch works well, although the cut-off point is different for FM than the other modes. "Proper" AGC times are switched with modes. I would prefer to have more control over this. Audio output was loud enough and low enough distortion for a mobile set up. With the synthesizer stepping at a 10 Hz rate, the tuning was very smooth and seemed continuous.

Overall I am very pleased with this new rig. It is a real joy to operate. All of the "bells and whistles" on the 430 are features that can be effectively used to make operating much more relaxing and enjoyable. (Thanks, Jeffrey W. Moore, N1BQF)

NOTES AND IMPRESSIONS ON THE KENWOOD TS-430S TRANSCEIVER

Having been fortunate enough to obtain one of the first TS-430S units brought into this country and used the radio for several weeks now, I thought perhaps people out there would be interested in some comments on Kenwood's latest piece of equipment. I will also make some comments on items not made too clear in the Instruction Manual.

As for general comments, the radio certainly filled a need at this station. It is compact, DC operated so that both mobile and emergency portable operation are possible. It has receive capability from 150 kHz to 30 MHz continuously, with AM and FM modes, in addition to the usual CW-SSB. Use of the FM mode requires the installation of an optional FM module. I had often wanted one of Kenwood's R-1000 general coverage receivers but could never justify the expenditure. Along came this "do everything" radio which does what the R-1000 does plus much, much more.

A great deal of attention has been paid lately to receiver performance, particularly in terms of dynamic range and intermodulation problems. On paper, the specs for the TS-430 look promising indeed. A receiver with a 3rd order IM point of +12 dBM is a phenomenal unit in anyone's book. However, let it be said that VERY FEW receivers available to the amateur market will come close to such specs. Based on techniques presented by Wes Hayward, W7ZOI in July 1975 QST, only four solid state receivers out of some 25 exceeded 0 dBM in 3rd order intercept specs over the past few years. To the point! attempts were made to measure receiver specs according to W7ZOI's methods, (also used by ARRL in their evaluation tests) and I was not able to approach the claimed 100 dB of dynamic range. However, as with many of the new synthesized radios, L.O. noise prevents getting useful readings of some parameters. (See ARRL's evaluation of the Collins KWM-380, Oct. '82 QST.) This same problem has cropped up with many of the newer radios using synthesis. Thus, without a two signal evaluation which leads to a dynamic range figure, which in turn allows computation of 3rd order intercept, these specs are not verifiable at this time.

The spec that could be checked was Minimum Discernible Signal (MDS), i.e., the smallest signal that will produce a 3 dB increase above the noise level of the receiver. This was measured at a consistent -140 dBM, or very nearly down to .02 uV. This is as good as any receiver evaluated to date and the only other receiver that equalled this sensitivity used a preamp to attain it. The TS-430S works directly into a balanced mixer which is the approach necessary to obtain good dynamic range in a receiver. As a general statement, raw sensitivity and excellent dynamic range are mutually exclusive specs in a receiver, it is difficult to have both at the same time. So much for lab specs.

The sensitivity of the TS-430S is very obviously more than adequate. On the air performance indicates that the dynamic range and IMD specs are as good or better than many receivers evaluated here. Incidentally, the MDS was tested side by side with my TS-820S which measures -136 dBM, a figure that is slightly better than the average solid state receiver around today.

MDS and two signal tests were made using the YK88C 500 Hz filter in the CW mode. Note that the filters available for the TS-430S are the same models as used with the TS-530S, TS-130, etc. There are slots for three extra filters in the unit. The first slot is for the CW filter (either 270 Hz or 500 Hz.) In the CW mode, the Wide-Narrow switch gives selection of either 2.4 kHz or whichever CW filter is installed in the first slot. In the SSB mode, the Wide-Narrow switch selects the "normal" 2.4 kHz filter or the 1.8 kHz filter if it is installed in the second slot. The third slot is reserved for the accessory 6 kHz AM filter. If no accessory AM filter is installed, the 2.4 kHz filter is selected in the AM mode. If no accessory filters are installed, no reception is available in the Narrow mode. The Wide-Narrow switch is inoperative in the FM mode and no FM reception (or transmission) is available without the FM module.

Other features of the receiver include squelch (All mode), IF Shift, notch, NB and the Scan-Memory function. Brief comments will be made with regard to some of these.

I found the squelch sensitivity to be quite low. It took a fairly strong signal to open it. Also, in the Scan mode, it does not stop the scan as some might expect. The IF shift is the same as with other Kenwood models and is quite useful at times. The noise blanker was unimpressive as seems to be the case with 90% of the noise blankers I have tried. It has no threshold control or pulse width selection and so is useful for some kinds of noise and ineffective with others. The notch control is quite effective in terms of sharpness and depth of rejection. My only complaint with the notch is that the control knob is very small and very critical to set on frequency. No problem if you're not rushed for time. For routine, casual operation, where an adjacent signal is causing problems, it is very useful and effective.

The Scan and Memory functions take considerable getting used to if you've never dealt with this type of operation. The system gives you practically unlimited combinations of split operation including split band and mode. The memories remember both frequency and mode information. As for memory from initial turn-on, it always comes back to the frequency-mode where the unit was when you turned it off. This sometimes presents a minor problem but one that is easily overcome by the use of the memory channels. For example, if you last had the unit set on 28.500 MHz, and your next operation was to be 160M, if you step the band switch down, you will end up on 1.500 MHz (and USB from the 10M operation). Normal tuning mode is 10 Hz steps and at that rate, it could take you quite a while to tune up from 1.500 MHz to 1.850 MHz, and, of course, you would have to change to LSB. The "Step" switch next to the tuning knob gives selection of 100 Hz tuning increments which gives rapid tuning from one widely separated frequency to another. This entire operation can be speeded up simply by loading 1.850-LSD into one of the memory locations. Thus you can simply switch to that memory channel and have instant push button selection of your favorite 160M frequency. The various memory locations are useful for storing various favorite band-mode information, WWV, and selected other frequencies-modes that you want to have instantly selectable or scannable. Memories #6 and #7 set the limits for frequency scan or can also be used for discrete frequency in the same manner as other memories. PG.S is the frequency scan mode. The Hold switch stops the frequency scan and a slide pot on top of the unit sets the scan rate. With the pot set midway, scan can be stopped at the proper SSB tuning with just a little practice. With the Hold button depressed, frequency control is reverted to the tuning knob and transmit is immediately available. Releasing the Hold button will make the unit resume frequency scanning from where it left off. Releasing the PG.S button will cause the frequency to revert to the last frequency you were using prior to activating the frequency scan mode, which conceivably could be another band altogether. The MS button gives scanning of all the frequency-mode M.CH locations for approximately 1.8 seconds for each channel. The versatility of the memories and scanning features challenge the imagination. The Lock push button removes frequency control from the main tuning knob. It prevents the possibility of bumping the knob off frequency accidentally, especially in mobile operation. Lock only controls the knob, however. You could still recall memories via the MR-M.CH controls. The Band Up-Down controls have two modes of operation, the normal mode is stepping up and down by bands, including the new WARC bands. In the "1 MHz Step" mode, frequencies are stepped up or down in 1 MHz increments.

That just about covers some of the more routine comments regarding this unit. Little can be said about transmit. Comments as to transmit audio quality have indicated clean, clear audio with plenty of punch. Incidentally, the receiver audio quality is exceptionally good compared to, for example, the TS-820S. Quite a lot of time was spent listening to AM signals, both short wave and standard broadcast. I found the audio quality using the 2.4 kHz filter to be quite adequate and pleasant and have no plans to buy the 6 kHz optional filter. Sensitivity from 150 kHz to 1.8 MHz was found to be good enough for even serious DXing. (A 750' beverage receiving antenna may have helped.)

Now we'll get into some of the less routine comments regarding the TS-430S. Almost as soon as the 430S hit the market, there was a rumor that removing one diode (D40 was mentioned) from the RF board (X44-1510-00-11) would give the unit general coverage transmit capabilities. To make a long story short, disabling pins 2 or 3 individually on Connector #10 of that board DID NOT enable the unit to transmit outside the microprocessor interlock (the same effect as removing diodes D40 or D41). The total disconnect of connector #10 did enable the unit to transmit outside of those frequencies listed in the chart on Page 22 of the Manual (the bottom chart, ACC connector output, Pin 5). As you may note, this chart represents the only frequencies where an unmodified TS-430S will transmit. In some cases, there is plenty of overlap for out-of-band operation. A notable exception is the 80M segment where coverage cuts off abruptly at 3.999 MHz. There are a number of widely used MARS frequencies from 4.0 to 4.1 MHz. Removal of Connector #10 will enable transmission in that area, and as far as I checked just about anywhere in the 3-30 MHz range. A word of caution is advised here. Besides the question of operating on authorized frequencies, no tests have been run on possible spurious emissions that are possible in operating the unit on frequencies for which it may not have been intended. Chances are good that no problems would exist in areas just outside the "normal" frequency areas but it would be advisable to have such a modified unit tested for spurious outputs with a spectrum analyzer, or at least a check through the spectrum with a general coverage receiver. As I have no need for such outside frequencies and lack the equipment for spurious checks, I'll leave that project to someone else.

On the subject of other frequencies, this unit came equipped with the 10 MHz WARC band enabled at the factory. D66 and D67 enable the 18 and 24.5 MHz bands respectively. As for where these diodes are located when the time comes, try looking on the RF board, left front corner to the left of the little shield partition that houses Q1, Q2 and the three toroid transformers. It's tight in there so good luck. Make sure you have positively identified the diodes before cutting (when we have those bands, of course, or again, you're on your honor). If disconnecting connector 10 does the same without other problems, it may well be the easier way to enable these bands.

As you note, the TS-430S uses an 8 pin mike connector to facilitate provision for Up-Down mic tuning controls. Owning an MC-50 and many other mikes and not being particularly interested in remote mike tuning, I adapted these to the 8 pin connector system. Pin 1 is mike "hot", Pin 2 is PTT, Pin 8 is PTT GND and Pin 7 is mike SHIELD. The connectors are available from the dealers ($2.60). There is also an adapter Kenwood P-N MJ-48 ($9.95) or you can make your own adapter using the 8 pin plug and 4 pin jack. Quite a number of mikes were tried with the TS-430S. All worked. Some had to be padded down to the level of the MC-50 as shown in the Manual. Many on-the-air comments were solicited regarding mikes. Of all the ones tried here, the MC-50 and an old Shure 404 were judged to sound the best. The Manual specifies that either high or low impedance mikes will work, the low impedance requiring a higher mike gain setting. It is important to audio quality not to use a mike with more output than the output of the MC-50 or MC-60.

One 8 pin mike plug and one each of the seven and eight pin DIN plugs are furnished with the units. Additional DIN plugs are available from the dealers at about $2.00 each.

Speaking of DIN plugs, little is said about the transverter plug, J3, particularly relative to transverter operation. There are instructions relative to using this plug to interface auxiliary receivers, antennas, etc. via this jack. To my knowledge, Kenwood is not producing (for U.S. market) any VHF transverters. The older TV502-506's would not work because of their requirement for +220V which was "stolen" from earlier model transceiver drivers. So here is the rundown on the XVTR jack pins:

Pin 5 - Input to receiver from transverter receive converter output (with XVTR plug inserted).

Pin 7 - HF output from exciter to transmit converter (measured at 10 MW output at 28.1 MHz).

Pin 4 - Must be grounded when using transverter to disable high power output through normal TS-430S antenna jack.

Pins 1 and 3 are ground.

Pin 2 - +12V relay drive on transmit.

Pin 6 - Transverter ALC (function unknown).

Pin 8 - Not used for transverter operation but see Page 23 of Manual for auxiliary antenna-receiver use.

It being that I am on both VHF and 160M, J3 has a number of potential uses for me, although there is no need for transverter operation at this time, it is nice to know the function of the J3 pins. Knowledge of these pin functions should enable the VHF operator to interface his favorite transverter to this unit.

J2 DIN Plug: Pin 1 - Speaker output (extra), Pin 2 - Relay common or ground, Pin 3 - PTT Line (for foot switch or aux PTT), Pin 4 - N.O. relay contacts (for linear activation), Pin 5 - Relay N.C., Pin 6 - ALC input, Pin 7 - No connection.

J4 DIN Plug, (ACC) - The Instruction Manual covers this one pretty well except for Pin 6, TPD. This is the one referred to in the Note, Page 22, but not properly identified. TPD, Pin 6 is a line that gets grounded probably in FM mode and in domestic (Japanese) versions where outputs are to be limited in certain bands-modes. Pin 5, WRC is the line out of the IC1 of the controller board which provides transmit interlock. No immediate use is known for the logic levels provided by J4. Perhaps some future accessory or maybe some sharp ham will come up with a use.

The PS-430 Ac to DC supply has not yet been received so no comments can be made at this time. A general purpose supply supposedly capable of 20A peak, 16A continuous has been used. The supply used has been borderline probably due to lack of adequate filtering and not enough pass regulators. It does work but the TS-430S does not like to be "whistled at" using my existing supply. Kenwood recommends their PS-430 supply for obvious reasons. If you do use another supply, it would probably be advisable to make sure that it has plenty of reserve on peaks. Probably 75,000 Mfd and a minimum of four 2N3055 type pass regulators would be O.K. The Kenwood supply is certainly recommended as we know it will work and it's lightweight and matching appearance.

Overall, I am very pleased with the TS-430S. It does just about everything I could expect out of a rig, and I would not hesitate for a moment to buy another one. (Thanks, L. L. Filby, K1LPS) (Diagram on Pg. 8)

NOTES ON TS-430S

One item that is apparently of interest to a number of people is the tuning rate of the TS-430S. In the normal 10Hz steps mode, it comes out to about 10 kHz per dial revolution. The TS-820S, for example, is about 20 kHz per dial revolution. The slower tuning rate of the 430S is used to good advantage, particularly in mobile operation. Of course, if you're in a hurry, you can always use the 100Hz steps mode. Many people who have tried my TS-430S have been immediately impressed with the tuning rate.

One aspect of the TS-430S has cropped up several times during mobile operation. The radio should always be turned on and off via the front panel push button. It is particularly important that the radio be OFF when engaging the starter of the car. If the unit is on while starting the vehicle, there is a better than average chance that you will dump existing memories. This is apparently caused by instantaneous drop of vehicle system voltage. The same thing would apply if you shut down the AC supply with the front panel ON-OFF switch on. One might think that the lithium battery memory backup would prevent this but it apparently only functions when the unit is shut down from the front panel push button. The memories dumped on me several times during mobile operation before I caught on to what was happening.

In my original evaluation, it was stated that the TS-430S could not be used with the older TV502-506 VHF transverters. After some discussion with owners of these transverters, it appears likely that they could be used. The 220V out of the earlier Kenwood radios is routed to the transverters for switching and control purposes, not to power them. Examination of the circuitry should suggest how they could be used with the TS-430S.

The suggestion made in Issue K-32 regarding using the TS-430S as a precision signal generator is an excellent one. One easy way to accomplish this is via the transverter plug. Grounding pin #4 will disable any output from the antenna connector. 10 MW (+10 dBM) is available at Pin #7 and that can be further reduced to known levels using a step attenuator.

One additional comment regarding the removal of Connector #10 for general coverage transmit. The PD (Power Down) line is routed through that connector (Pin 1). This is of no consequence unless you plan to use the FM module. In that case, you might want to remove Pins 2 and 3 from the connector body, leaving the PD function intact. (Thanks, K1LPS)

NEW TS-430S MODS

Add 8-pole 1.8 kHz narrow SSB filter to your TS-430S and obtain a superior Shape Factor. The 8 pole filter is physically larger but still fits in the same space. Comes complete with instructions and parts from I.R.I. Price $49.99 plus $5.00 shipping and handling.

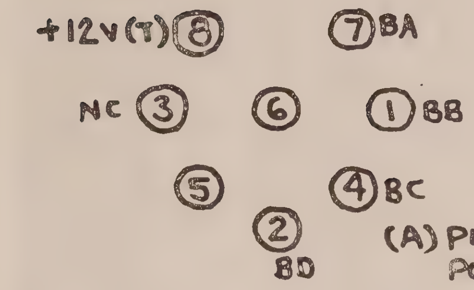
Add 400 Hz or 250 Hz 8 pole CW crystal filter to your TS-430S for a superior Shape Factor. The 8 pole filter is physically larger but still fits in the same space. Comes complete with parts and simple instructions from I.R.I. Price each filter $49.99 plus $5.00 shipping and handling. Note the 250 Hz filter is very sharp so unless you are a serious CW op, use the 400 Hz filter.

TS-430S CASCADING KIT

Add another 8-poles of crystal filtering to your TS-430S for a total of 14 poles of filtering instead of 6 poles. The added filter is patched in before the Product Detector, and is in the Receive mode only. (The following information was reprinted from the 1983 ARRL Handbook, Page 8 - 46: "Wide Band noise is generated within most i-f amplifier chains. An improvement in receiver "noise bandwidth" can be realized by adopting the W7ZOI filter "tailending" scheme which calls for use of a second i-f filter immediately after the last i-f amplifier. The second filter can have a slightly greater bandwidth than the filter used ahead of the first i-f amplifier. The tailend filter will reduce the wideband noise components. (Continued on Page 9.)

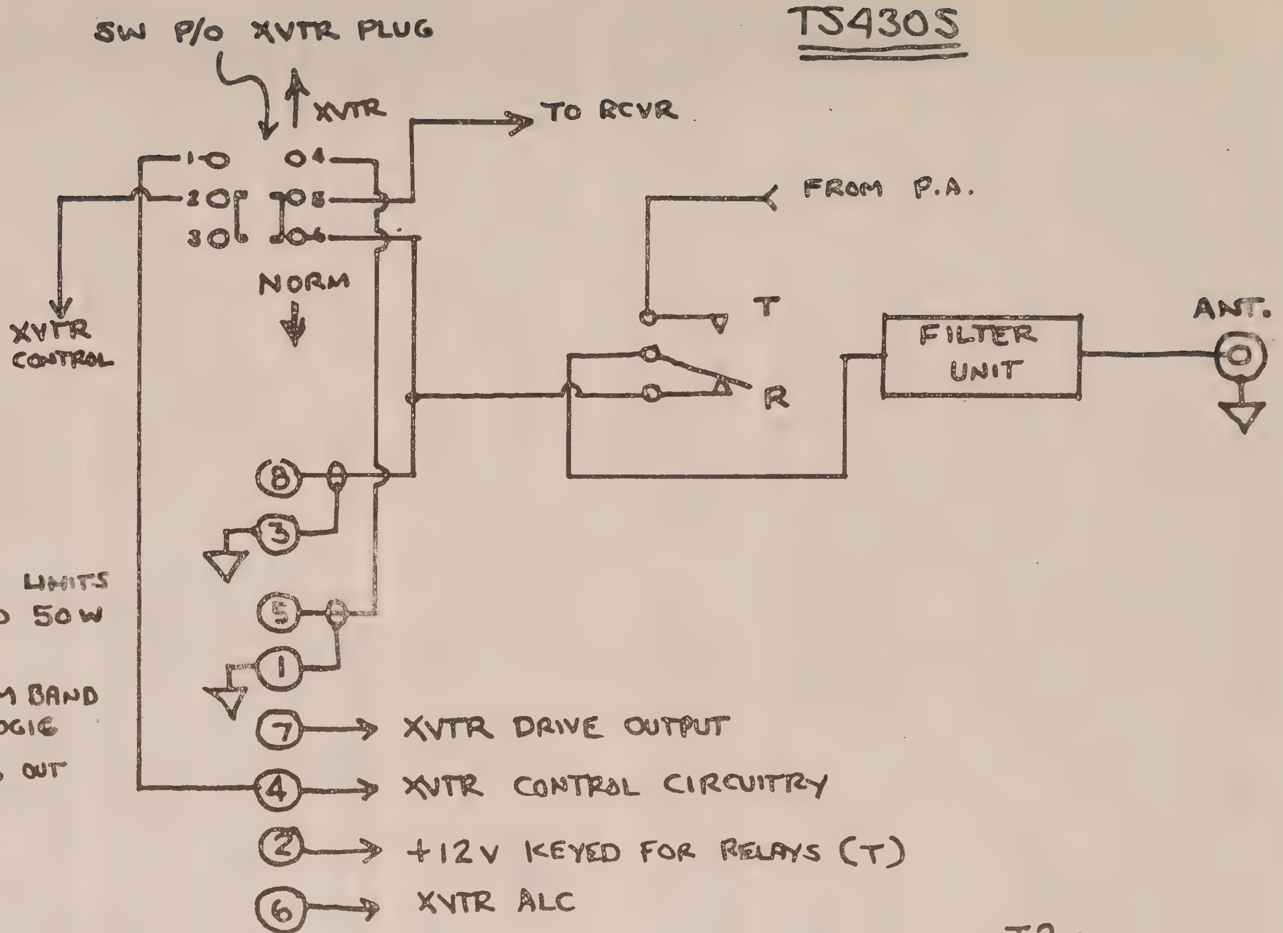
TS430S

J4 (ACC.)



(A) PIN 6 TO ⏚ LIMITS POWER OUT TO 50 W

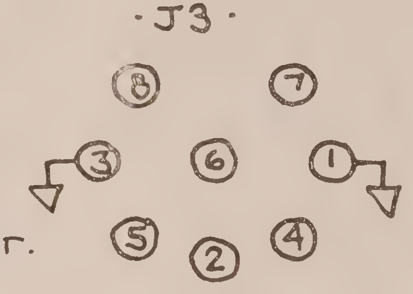
(B) PIN 5 - HAM BAND INTERLOCK LOGIC
(⏚ PROBABLY CUTS OUT TRANSMIT.)



- J3 XVTR PLUG -

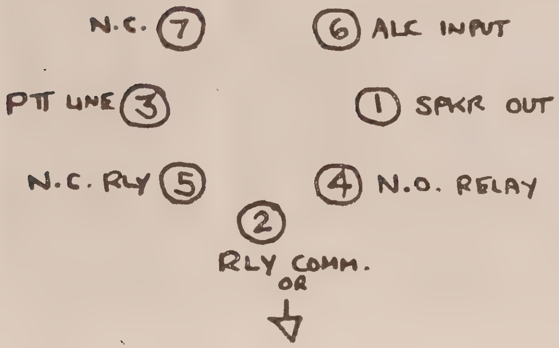
PIN ④ = THRU XVTR SWITCH → PIN 3, CONN. # 11 OF RF UNIT.

PIN ⑥ = ALC (XVTR) CONTROL VIA PIN 1, CONN. # 16 OF I.F. UNIT.



WIRING END OF XVTR PLUG.

J2 (REMOTE)



BY K1LPS

"Enjoy a lower noise floor, improved Front End Dynamic Range and increased Selectivity. The kit consists of a prewired tested PC board with a 2.1 kHz filter installed, complete instructions and minimum tune up. This modification greatly improves the Selectivity and above receiver parameters. A BIG BANG FOR YOUR BUCKS.

The TS-430S is basically a fine radio with a great receiver front end, but it's selectivity is no better than the TS-120-130 series. That is until you add the above kit. From IRI - price $79.00 plus $5.00 shipping and handling.

TS-430 RF SPEECH PROCESSOR

The Magicom RF processor will increase the average signal power to the antenna by as much as 6 dB. In addition, a significant "talk-power improvement will be realized over the existing processing methods used in the TS-430S. Installation of the MAGICOM into the 430 is straight forward. The only tools required are a low-wattage soldering iron, a needle nose and diagonal pliers, and a small Phillips screwdriver. Supplies required are a small length of rosin flux solder and a small piece of "solder wick". The installation of the MAGICOM into the TS-430S does not require drilling any holes or other nonreversible modifications to the equipment. The processor is wired, tested and with complete instructions and pictorials. The processor mounts on top of the IF Unit Board to the left of the crystal filters. The MAGICOM is available directly through IRI for $50.00 plus $5.00 shipping and handling.

MORE IRI TS-430 CASCADING KIT NOTES

In the IRI TK Newsletter #34, Page 25, we described a new cascading kit. The IRI Labs have measured several TS-430's with kits installed. The results are as follows:

	Stock TS-430S	Cascade Kit 430
Selectivity	2.4kHz 6dB-4.4kHz 60 db	2.0kHz 6db-2.8kHz 60db
Noise Floor	137dBM (.032uv)	140 dBM (.024uv)

A further performance increase will be noted when the optional 1.8 kHz filter is installed in 430. The results will be as follows: Selectivity 1.7 kHz at 6 dB...2.2 kHz, Noise floor 142 dBM (.018uv).

Operation: After installation, you will notice a quieter receiver, improved selectivity, and improved IF shift performance in all modes. After this modification, the TS-430S becomes a standard of comparison.

The TS-430S kit is available only thru IRI for $79.00 plus $5.00 shipping and handling. This kit includes all parts and instructions and only requires connecting two coaxial lines and one wire into the 430. Installation time is about one hour and requires good soldering skills and the knowledge of locating components on printed circuit boards.

NEW TS-430 SERVICE MANUAL

Kenwood has just released their latest TS-430S Service Manual identified by the following number in the right rear corner of the back page - 1984-2-B51 0980-10 2 . (IRI LABS)

TS-430 SPACE FOR ADDED XTAL FILTER

Space may be found in the TS-430 for an additional crystal filter or other added component of similar size.

After removing the top cabinet cover, remove the two screws holding the Vox adjustment and scan rate controls. Beneath the pot bracket assembly is a cavity large enough to accommodate an International Radio Inc. crystal filter. It may be necessary to remove the IF Board and holder to gain enough clearance to insert the crystal filter into this space. Be sure that the crystal filter is well wrapped in plastic tape to prevent contact with adjacent circuitry.

I have been using this scheme for a year in my FM equipped TS-430S which has five added non-Kenwood crystal filters. No adverse affects have been encountered. (Thanks, Mel Silver, W9RXU)

HE LIKES HIS 430 KIT

I have a Kenwood TS 430S in which I installed your CW Filter 400Hz. Also installed the TS-430S Cascading Modification Kit. It sure helped the selectivity. I used to have interference on both sides of the frequency I was listening to. Now I don't have that. Thank you for helping me to make a better set out of my 430S. Have very good reports on my signal also!! (Thanks, George Dedic, N6FCZ)

TS-430 SPEECH PROCESSOR IMPROVEMENT

The type of speech processor circuit used in the TS-430 is an agc (automatic gain control) driven audio frequency amplifier. The circuitry is dimensioned such that a fairly long time constant in the agc is involved, resulting in an audio 'leveler' performance. As a matter of fact, the IC used in this circuit is a NEC uPC1158H2, which generally is found in tape recorders for automatic volume control.

By decreasing the time constant substantially, the speech processing effect will be improved. The modification is very simple. Replace capacitor C104 -- 4.5 uF on the IF board by a smaller value of 0.47 uF. Even a lower value can be used, but be sure to select a value greater than 0.1 uF, otherwise some instabilities might occur.

To modify this capacitor:

1. Remove the IF board as indicated for CW filter installation.
2. Remove C104 from the board.
3. Mount a 0.47 uF capacitor on the board.
4. Mount the IF board as indicated by CW filter installation.
5. Make the transceiver fully operational again.
6. Adjust the MIC gain without the processor until normal ALC deviation.
7. Switch the processor on and adjust VR7 near to C104 on the IF board until normal ALC deviation. (Do not alter the MIC gain at this time.)
8. That's everything you had to do.

I wish to thank ON4AMI, ON7PG and ON4DE for critical listening on the air. (Thanks, Andy Vercruyssen, ON5DO)

TS-430 NOISE BLANKER UPDATE

This may be of interest to TS-430 owners. Earlier newsletters had reported that the noise blanker's performance could be improved by changing the value of "R81" (RF Board) from 10K to 22K. My late model (ED NOTE: It would be a good idea to include your serial number!!) TS-430S shows that Kenwood is now using a value of 56K (5% - one-eighth watt) for "R81". (I do not know whether Kenwood has made other modifications to the blanker circuitry.) For the fun of experimenting, I tried to replace this resistor with the previously suggested 22K, but then noticed a decrease of about 2 "S" units in the noise reduction effect. The 56K was restored, and using a spark-generating hair dryer as "Noisemaker", the "T-15" and "T-16" cores (RF board) were adjusted for minimum noise and "S" reading. The current TS-430S blanker appears to reduce the induced spark noise level from "S9+" down to "S4". (Thanks, G. Valadier, N2BFL)

TS-430 NOISE BLANKER IMPROVEMENT

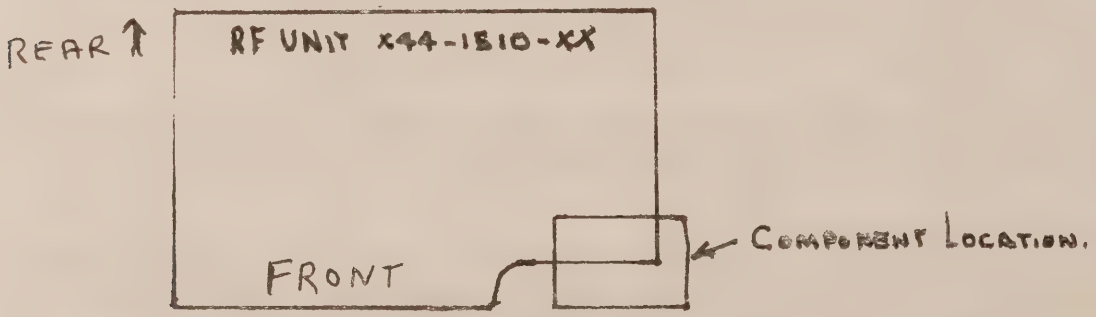
Try this mod to improve the 430 Noise Blanker. On the RF Board, locate R81, change it from 10K ohm to 22K ohm and retune T15 and T16 for minimum noise. (From the Kenwood Net)

TS-430S NOISE BLANKER IMPROVEMENTS

Some operators have indicated a desire to have their TS-430S noise blanker operate similar to the noise blankers in the TS-120S-130S series. By performing the following modifications, the operator will be able to increase the effectiveness of the TS-430S Noise Blanker Circuit.

On the RF Unit (X44-1510-XX) change the following components:

R80 - Change to 100K ohms one-quarter watt resistor (RD14CB2E104J).
R81 - Change to 56K ohms one-quarter watt resistor (RD14CB2E563J).
C125 - Change to a 560pF 25V disc capacitor (CK45B1H561K).



This is an optional change and may not be performed in Warranty. No realignment is required. (Thanks, Trio-Kenwood Communications)

TS-430S NOISE BLANKER TIP

I saved a lot of work in modifying my TS-430S noise blanker AGC. Instead of replacing R81 with a 22,000 ohm resistor, which requires lifting the RF board, I simply clipped and stripped the top lead of R81 and soldered a 15K ultra-miniature pot in series with that resistor. (Thanks, Mel Silver, W9RXU)

TS-430S NOISE BLANKER MOD

In addition to the 430 NB Mod (refer to Newsletter No. 34, Page 25), a further improvement can be realized by changing resistor R40 on the RF Board from a 470K to a 30K. This modification changes the noise blanker time constant. (Thanks, N0SS, Kenwood NET)

TS-430S SHIELDING DIFFERENCE BETWEEN OLD 430'S AND NEWER 430'S

We had reason to remove the control board from TS-430S Serial No. 3051125. In a comparison to the same control unit board, but from Serial No. 4040957, we noticed a brass shielded plate on the bottom of the control board which is located about the center of the board and the brass shielding is around L18 R63 test point TP2 and the other corner would be R76. On the very back of that board, you would see the four corners of that shield. Kenwood has installed a piece of brass shielding apparently to prevent radiation of that particular circuit to the rest of the board. I am not sure what it does at this point but I am sure they didn't change it for the sake of changing it. If anybody has any information on the mod, we would appreciate your comments. (IRI LABS)

TS-430 MARS MODIFICATION AND INFO

The TS-430S can be used on MARS frequencies (Full Transmit) by disconnecting Pin 2 of Connector 10 (TX1) on the RF Board and by removing Q22 on the RF Board. The TS-430S is capable of displaying 10Hz digital resolution. The information is shown in the Operator's Manual, Page 22 - 6.6. (Thanks, Bill Edwards, KA6SIE and Bruce Hittner.)

PANADAPTOR FOR TS-430S OR OTHER RIG

Ever since I got my Kenwood TS-430S last June, I had wanted to use it with the panadaptor I built for the old FT-101B. (See Feb. 1983 HAM RADIO magazine.) There were two main problems with the 430-to-panadaptor marriage. One, no I-F output on the TS-430 and two, the I-F frequency on the Kenwood is at 48 MHz, not 3 MHz as in the Yaesu.

To solve the first problem, I built the 2-stage buffer shown on the diagram. I tapped the I-F of the 430 at 48 MHz right after the first mixer (and before the first crystal filter. This is the widest bandwidth part of the receiver which is what you want for a wide-sweep panadaptor.) However, I didn't want any circuit loading or other ill effects to degrade the phenomenal performance of the 430 receiver, hence the buffer circuit of Figure A with its very high input impedance.

The circuit is built on a little one-half inch by one-half inch scrap of copper-clad board. (Just solder the thing together with short leads and use the board as the groundplane.) I placed it in the 430 in the space between D52 and J12 on the RF board. Insulate the buffer board, if necessary, to prevent shorts. The tap point I chose was at the end of C79 nearest the rear of the radio (the output of T4 just after the mixer). You can wick up the solder out of the C79 pc land and snake a pre-stripped length of #30 enamel wire in with C79's lead, then resolder. Keep the #30 wire length short, and all lengths short, up to the gate of the FET on the buffer board. Of course, you have to remove the TS-430's rf board for this operation, but it just unplugs with molex-type connectors and cute coaxial plugs.

The power connection for the buffer goes to switch +8V which I found available at the top of L65 (next to T4), just tack a wire to the exposed lead. The output of the buffer goes through a length of RG-164-U mini-coax to the unused terminal 3 and the shell (ground) of the ACC socket on the rear panel. No holes need be drilled in the 430. You can get easy access to this socket by unscrewing the final amp-filter section at the rear of the radio and swinging it down on its hinges.

The buffer does not load the receiver at all, no matter what you hang on the end of the coax output. With this I-F tap at 48.055 MHz, you can now add a single conversion panadaptor, as in the rest of Figure A, much simplified from the dual-conversion system for the FT-101. The figure numbers correspond to the circuit blocks in the original HAM

RADIO article. You'll need to modify a few tuned circuits but the results are quite worth your while---300 Hz resolution and wide dynamic range gives you a real visual aid to signal and band conditions across the spectrum.

If you already have an old clunky panadaptor (a BC-1031 or SP-44) or even a later model, and want to use it with any receiver, the circuit in Figure B is a buffer-converter system to translate the receiver's I-F to the input range of the panadaptor. The buffer is the same as in Figure A. Again, the tap point goes to the output of the first receiver mixer before any significant selectivity is introduced. You'll have to choose the crystal for the correct frequency translation, which includes getting the correct sideband out of the mixer so that the screen will show lower frequencies on the left and higher ones on the right. And by the way, you could get better resolution with the nominally broad BC-1031-SP-44 by adding a crystal I-F filter as in Figure 10 of the HAM RADIO article. I haven't tried the circuit with low-frequency crystals (262 kHz was used in the BC-1031 I-F), but it should work. The filter would go in series with the I-F chain in the panadaptor, right after its mixer.

Panadaptors are fascinating devices to watch and help you catch new signals or avoid clobbering existing ones. With these circuit ideas, you'll be able to add a visual dimension to your listening and increase the fun of tuning around the bands. (Check HAM RADIO October '82, Page 70, for some minor corrections to the original February panadaptor article.) (Thanks, Rick Ferranti, WA6NCX-1, 116 Franklin St., Arlington, MA 02174 (617) 646-6343. (Any questions regarding this article should be directed to the writer with a SASE.) (Diagrams on Pages 13 and 14.)

TS-430S AM IMPROVEMENTS

If you do not have the optional AM filter installed in your 430, try this: Follow the AM filter installation procedure as outlined in your Operator's Manual, except for the part that says remove the resistor across the AM filter terminals. Leave this intact. The AM fidelity should be much improved. Caution: DO NOT transmit AM mode after this modification. It is for Receive only. (Kenwood Users Net)

TS-430S AM WIDE-NARROW FILTER SELECTION

This procedure will allow selection of the Wide or the Narrow filter for AM.

Parts List:

2	2SA1115(E) Transistor	Q401, Q402
4	1S1555 Diode	D401 - D404
1	4.7K ohm one-eighth Watt	R405
2	22K ohm one-eighth Watt	R403 - R404
2	47K ohm one-eighth Watt	R401 - R402
	Insulated hookup wire #28 gauge or larger	J401, J402, J403
1	Short Jumper	

MODIFICATION PROCEDURE:

CAUTION: This modification requires advanced soldering and printed circuit board modification techniques and should only be performed by experienced kit builders or technicians. If you are at all unsure of your ability to install this modification after reading these instructions, please have someone with more experience perform the modification for you.

1. Remove the power connector from the radio.
2. Using a #2 Phillips screwdriver, remove the top cover (8) screws. Be careful of the VOX controls and the speaker lead which may be unplugged.
3. Loosen the two countersunk side screws and remove the 2 screws securing the IF unit bracket. Swing the bracket up slightly to access and remove the two heat sink screws. Swing the assembly down.
4. Remove 7 screws from the IF unit. Protect the top of the front panel from scratching.
5. Desolder IB1 and discard. Use a 45 watt or less iron and solder wicking.
6. Locate the white jumper wire that is plugged on to the "S" terminal of the IF unit. Desolder the wire from its present location and reinstall as shown in Figure 1.
7. Install a short jumper wire as shown in Figure 1. (Cont. Pg. 14)

TS-430S PANADAPTOR

(A)

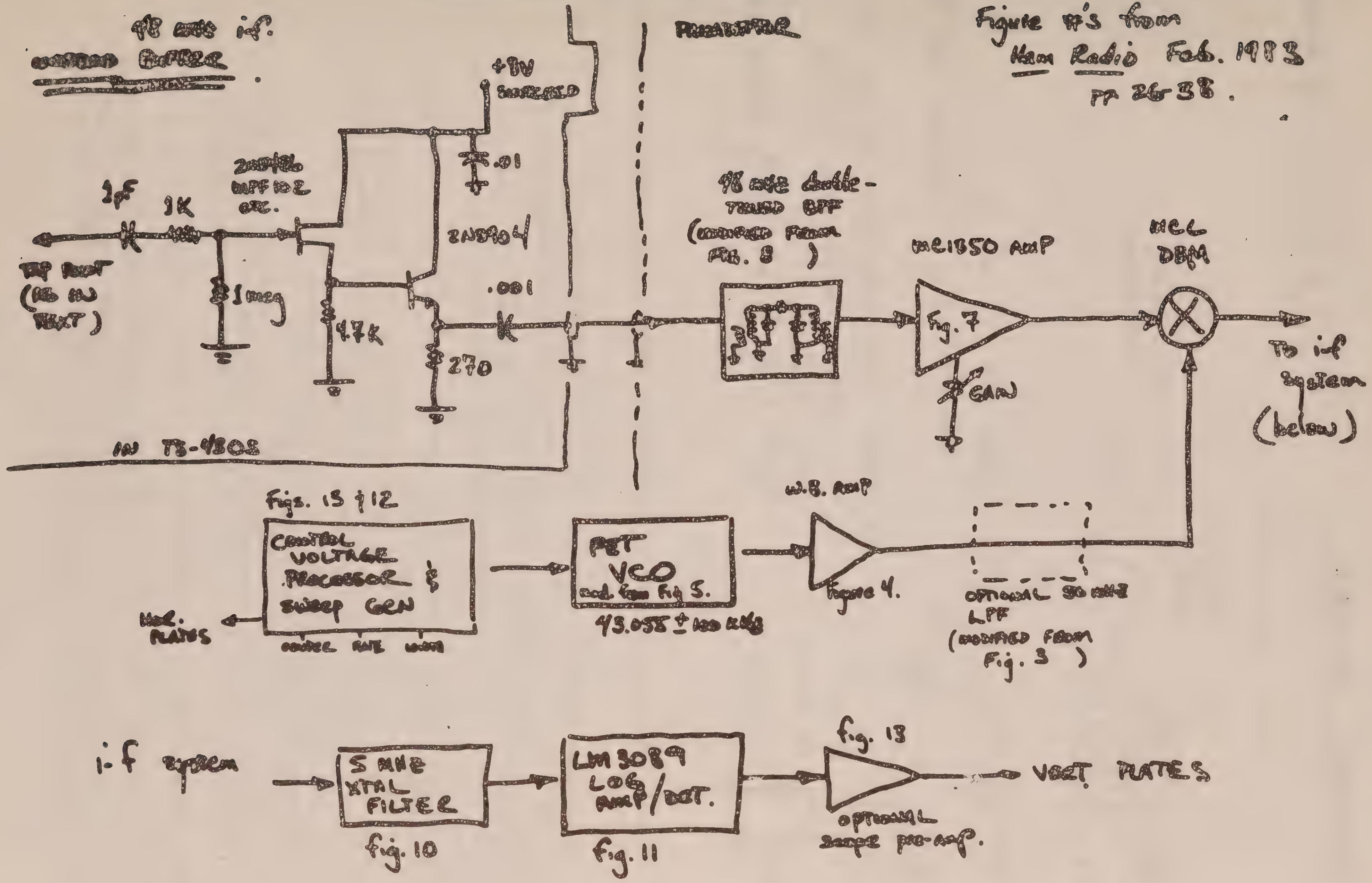
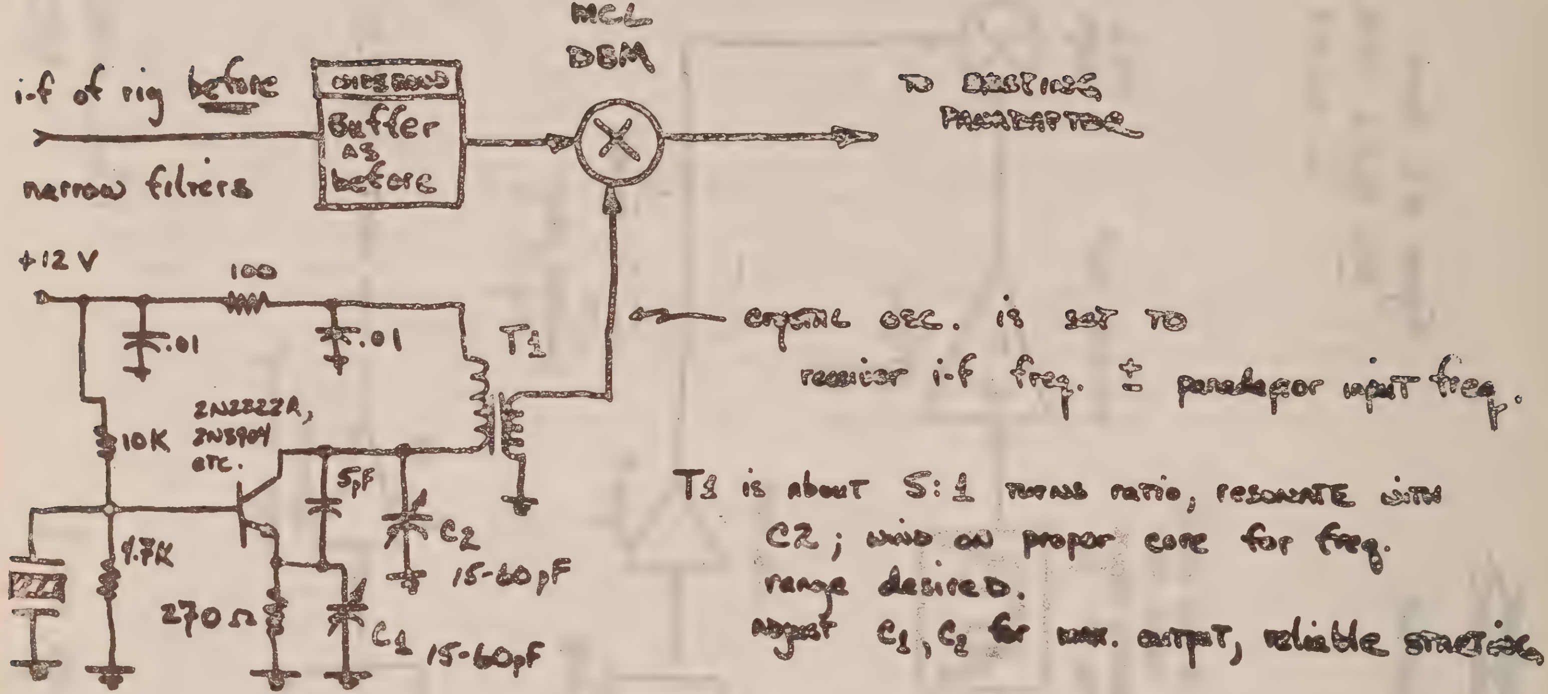


Figure #'s from
Ham Radio Feb. 1983
pp 26-38.

With proper freq. scaling will work with ANY
up-converting receiver (TR7, KWM-380, etc.)

Rick WA6NCX/1
8/83

(B) PANADAPTOR ADAPTOR (for any rig with any panadaptor)



crystal osc. is set to receiver i-f freq. ± panadaptor input freq.

T1 is about 5:1 turns ratio, resonate with C2; wind on proper core for freq. range desired.
Adjust C1, C2 for max. output, reliable starting

TS-430S AM WIDE-NARROW FILTER SELECTIVITY

(Cont. from Pg. 12)

8. Cut the foil paths as shown in Figure 2. There are five locations that must be cut. CAUTION: Ensure you cut only the traces as shown in the figure. Spend a little extra time to ensure you have correctly identified the trace to cut.
9. Install J401, J402 (may already be installed), J403, D403, D404, R403, R404 and R405 as shown in Figure 2. Use the shortest lead lengths possible. Check to ensure there are no solder bridges or splashes on the board.
10. Install Q401, Q402, R401, R402, D401 and D402 as shown in Figure 2, again being careful to check for solder bridges, shorts, etc.
11. Check to see if D82 is installed as shown in Figure 1. If it is not, install it (1S1555). D83 should also be installed on the foil side of the board as shown in Figure 2. Some units have D82 and D83 installed. If so, go to Step 12.
12. Move the filter select jumper to the "A" pin as shown in Figure 1.
13. On Control Unit (X53-1290-00) cut the lead of resistor R129.
14. Solder a jumper wire to the metal lead of resistor R129 as shown in Figure 5. Connect the other end to IF Unit connector 18 Pin 2 from the foil side of the board as shown in Figure 4. The wire may be conveniently routed between the circuit board and the chassis.
15. Install insulating tape below the area of the modification to ensure that no components short out against the case.

This completes the modification procedure. The TS-430S will now select either AM wide or narrow. Before reassembly, go back through the complete procedure and check your work to ensure no errors have been made. Please note -- This is an optional change and may not be performed in warranty. (Thanks, Trio-Kenwood Communications)

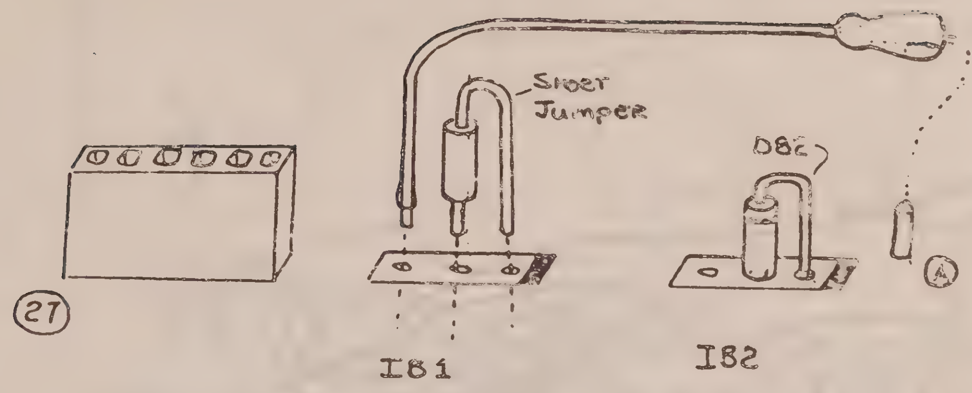
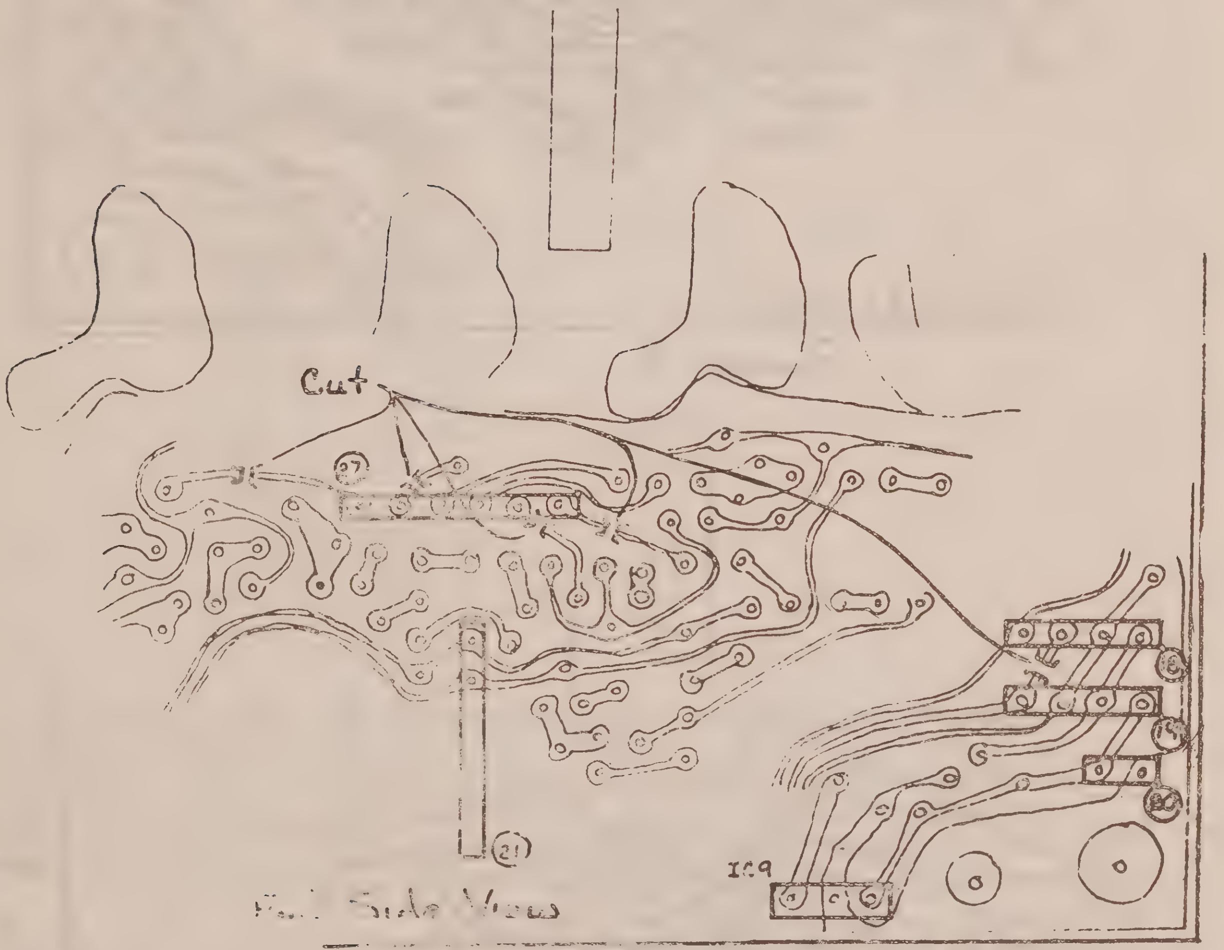


FIGURE 1



Foil Side View

FIGURE 2

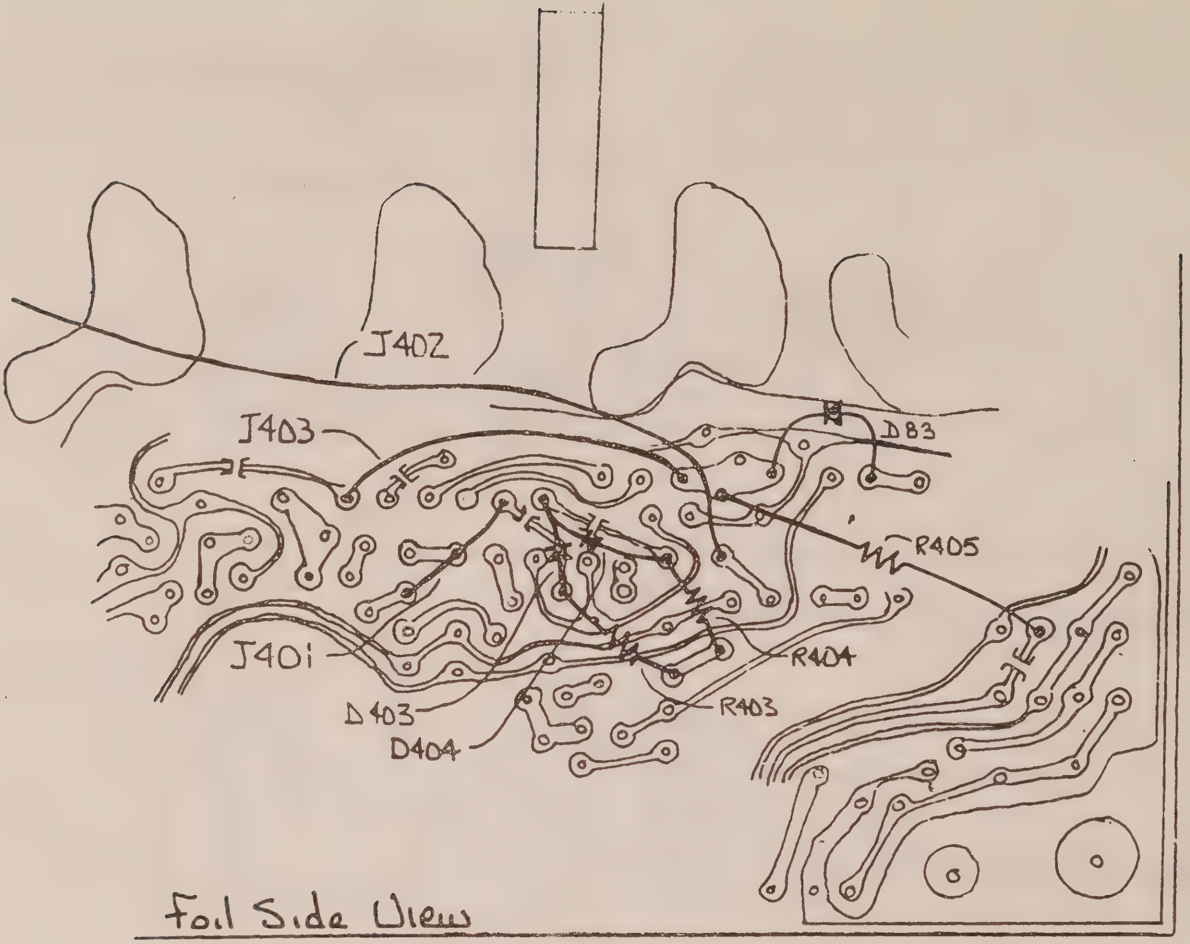


Figure 3

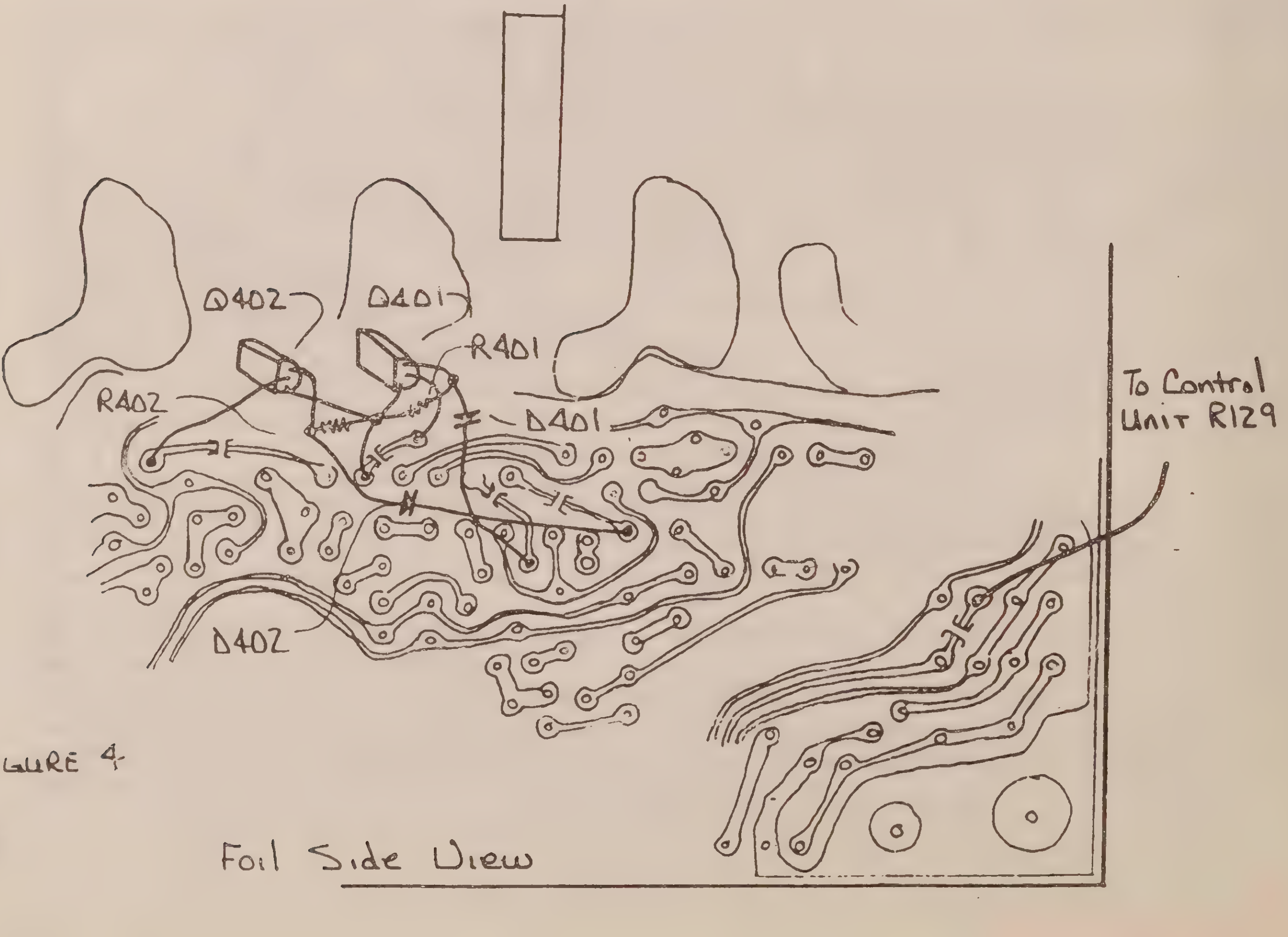


Figure 4

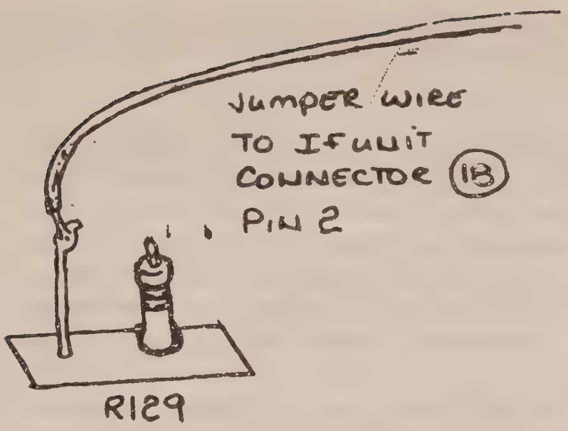


FIGURE 5

TS-430 TUNING IRREGULARITY

As per our telephone conversation 6-6-83, I am hereby giving written notice of a problem discovered in my new TS-430S, S.N. 3070445, after two days of use. I noticed an irregularity in the frequency tuning of the radio when using the VFO tuning knob.

This problem can be observed either in transmit or receive, with either 10 Hz or 100 Hz steps. On receive, I use a crystal oscillator running on 3995.13 kHz connected to the TS-430S antenna jack and a frequency counter on the speaker audio output. Using LSB mode with 100 Hz steps, I slowly turn the tuning knob clockwise until the display increments one step, stop, record the digital display frequency and the audio output frequency, then repeat this process. A table of results look like this:

Digital Display Frequency	Actual Frequency (crystal osc. + audio freq.)
3995.40	3995.40
3995.50	3995.40
3995.60	3995.60
3995.70	3995.70
3995.80	3995.80
3995.90	3995.80
3996.00	3996.00
3996.10	3996.00
3996.20	3996.20
3996.30	3996.20
3996.40	3996.40
3996.50	3996.50

It can be seen from the sample table that on some steps the display incremented, but the synthesizer did not. On the next increment, the synthesizer hops two steps and is then on the proper frequency. When homing in on a signal where the tuning knob may be rocked back and forth changing directions, the synthesizer may hop in the opposite direction of tuning. Is this action the ultimate in "state of the art performance" where the programmer installs a backlash algorithm complete with hysteresis and reverse rotationaL effects?

Several operator actions have been found that will correctly rechannel the synthesizer to the displayed frequency such as:

1. Changing the VFO function switch position.
2. M.CH switch on, then off.
3. Pressing a band switch, then returning to band initially in use.
4. Transmit, then receive.

Tuning the radio with the MC-42S microphone Up-Down buttons functions correctly. This was a redeeming discovery.

Since this behavior results in frequency errors of one "step", it could be summarized as a ± digit uncertainty; however, this cannot be passed off as proper behavior as you told me on the phone. Only analog-to-digital conversion has an inherent ± digit uncertainty of this sort. A digital readout and synthesizer, both updated by the same microprocessor, should have no uncertainty between them. The frequency indicated should be the actual frequency in use.

I have owned this radio for five weeks and have just finished inspecting 3 other TS-430S transceivers and have observed this same behavior in all of the units. This confirms my theory that the problem is a programming bug in the microprocessor, not just a hardware problem peculiar to mine.

On one hand, this behavior has apparently gone unnoticed by most operators and might be deemed insignificant. But I, on the other hand, have participated in the design of microprocessor-controlled synthesized radios since 1976 and have written synthesizer IC channeling programs. I was professionally outraged to find that I have purchased a synthesized radio which has a flaw in its most fundamental feature of operation, i.e., incremental knob tuning. How could this behavior elude the programmer, engineering technicians, project engineers and ultimately receive Quality Control acceptance for initial production?

I hereby declare this microprocessor programming bug to be a workmanship defect covered by warranty and ask you to provide me free of charge with a revised microprocessor part to correct the defect when the part becomes available. For possible use in this matter, my microprocessor IC markings are: NEC D8049C 279 8248H6

If Kenwood decides not to develop a revised part, I would like to have an assembler listing of the program sent to me so that I can prepare an external ROM modification. (Thanks, Thomas O. Bohlander, WA3KLR) (ED NOTE: Tom wrote this letter to Trio Kenwood, Compton, CA for an answer. We will keep you advised through our Newsletter.)

TS 430S 5KHZ MAIN TUNING MODIFICATION

Cut diodes D25, D27, D29 and D31 on the Control Board to provide 5KHz per turn dial rotation. (Thanks, Larry Phelps)

TS-430 AND OTHER ACTIVE AERIAL

Since becoming the proud owner of a Kenwood TS-430S and installing it in my car, it soon became obvious that the amateur band helical whips were almost useless for reception outside their design frequencies. Other owners of the TS-430 had also said they were disappointed with attempts to use the full coverage facilities while mobile.

A wideband receive aerial of some sort was required that would not affect the ham band transmit performance. The TS-430 can be used with a separate receive only aerial by connecting it through the transverter port. The problem was what to use. Some mean of using the present car broadcast whip was the obvious choice. The broadcast whip gave very poor results because of its short length and the lack of any matching into the 50 ohm input of the transceiver. A matching device and wideband amplifier would be needed. A number of magazine articles about active aerial amplifiers were consulted and tried, but they all had rather noisy amplifiers. I finally settled on the following:

A MPF 102 is used to present a high impedance to the whip and provide a low impedance drive to the wideband amplifier. The wideband amplifier uses a 2N5179 biased to 20 mA. It has an input impedance of 50 ohms, 17 dB gain, bandwidth of 300 kHz to 70 MHz, and good noise performance. It is capable of 10 mW output without any gain compression so has good intermodulation performance.

Because of the high input impedance of the MPF 102, it is important that capacitance on the input be kept to a minimum. Any capacitance here will result in signal loss, especially at the higher frequencies. To reduce this, I mounted my input stage at the whip's screw-in coax connector.

The wideband amplifier was mounted in the car so that it could be easily switched from the broadcast whip to the helical, if required. The whole system was installed in the car and worked very well up to 14 MHz. Above this, there is progressively more loss because of the capacitance at the input of the MPF 102. The next problem was to connect the broadcast receiver back up to its aerial.

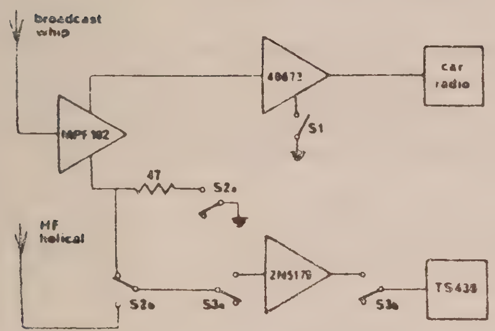
A second feed was taken from the input stage. From there is was amplified by a 40673 IGFET with a 2.5 mH choke as the drain load to provide a high impedance feed to the receiver. This has to be high impedance to allow the input circuit of the broadcast receiver to tune. This arrangement worked very well, but it was necessary to reduce the gain when listening to our local station which is only 2 km away, to stop overloading the car radio.

The 47 ohm resistor terminates T1 when the input stage is not connected to the TS-430.

The active aerial will give good performance for general listening at the home station.

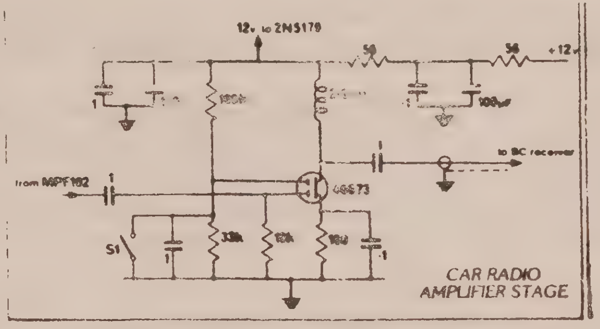
If care is taken to keep stray input capacitance to a minimum, the active aerial can be useful up to 30 MHz.

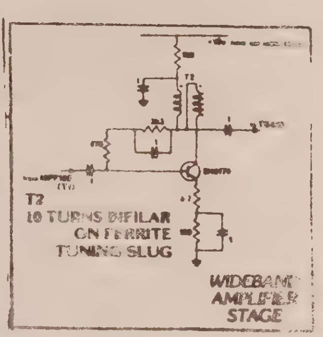
For low noise reception on the lower bands, a balanced input stage with a short dipole as the aerial can give performance similar to a full size dipole. By rotating the aerial, it is possible to null out interfering signals or noise. (Thanks, Break-In)

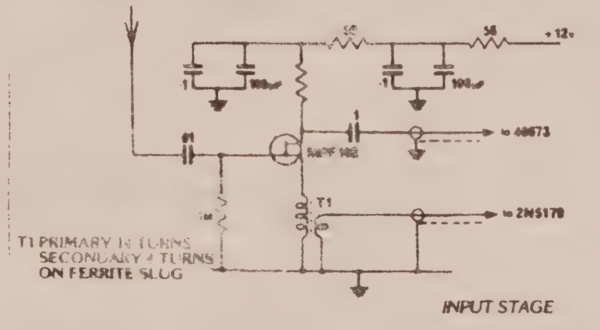


SWITCH	USE	POSITION SHOWN
S1	Car Radio Gain	High Gain
S2	BC Whip/ HF Helical	BC Whip
S3	Preamp IN/OUT	AMP OUT

BLOCK DIAGRAM







AMTOR MOD FOR TS-430S

The following modification was given to me by Trio-Kenwood based on information they received from a DJ8:

Make the following changes on the IF board of the TS-430S:

1. Change C164 from .22mfd to a .01mfd disc ceramic. This speeds up the time for change-over from transmit to receive.
2. Change C60 from 10mfd to 4.7mfd. This speeds up the transmit turn-on time for activation.
3. Remove D50. This appears to speed up activation of the receiver. D50 seems to be intended to mute the receive audio for an instant during change-over to receive. Except for some moderate clicking in the receiver audio when keying CW, and only when using the 400Hz crystal filter, removing C50 does not appear to have any adverse affect.

Trio-Kenwood stated that they had not tried these mods. I found that the changes resulted in improved performance on Amtor, especially for DX. However, I did not measure the differences in switching times. I would be interested in reports from others who may want to try this mod. (Thanks, Mel Silver, W9RXU)

TS-430S AMTOR MOD NOTES

This confirms my prior advice that there was an error in my article entitled "Amtor Mod for the TS-430S".

See IRI Kenwood Newsletter No. 47, Page 34. In the next to the last paragraph, "C50" should be "D50". C50 is not involved in this mod in any way. The mistake was mine, not that of the T-K Newsletter and for this I apologize.

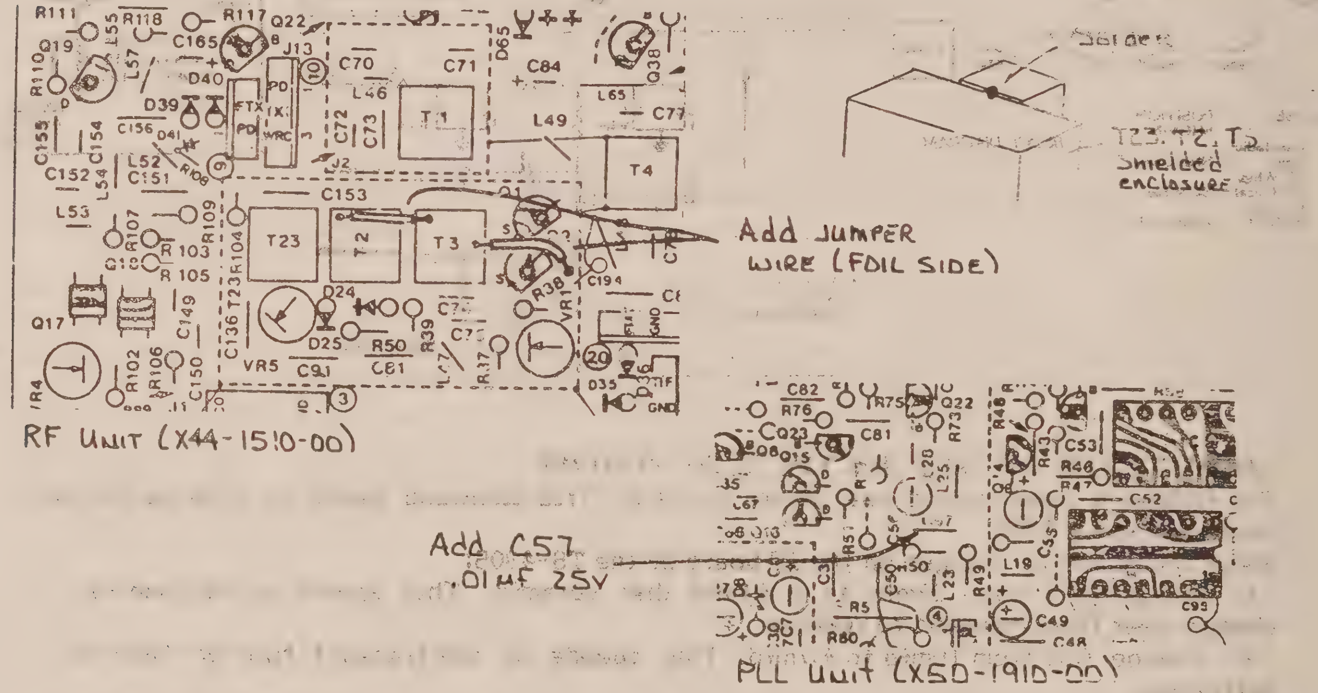
The amtor mod may also result in speed-up of transmit-receive switching approaching CW break-in performance. I did not compare the before and after performance on CW but with the amtor mod, I am able to hear signals during key-up while sending CW. The Vox should be set for the shortest delay. The break-in possibilities are worthy of further investigation. (Thanks, Mel Silver, W9RXU)

TS-430S RECEIVER INTERNAL BEAT

For reports of an internal beat at 28.415MHz or at 21.526MHz perform the following modification.

1. On the RF Unit (X44-1510-00) add a short jumper wire from the primary ground of transformer T2 to the primary ground of T3 as shown.
2. Add a jumper from the ground of the secondary of T3 to the ground side of capacitor C194 as shown.
3. Solder a jumper from the shield surrounding T1 to the shield surrounding T2, T3 etc. It may be possible to just bridge the two cases together with solder, either way is acceptable.
4. On PLL Unit (X50-1910-00) locate the position shown for capacitor C57. This capacitor was not installed at the factory. Install a .01 uf 25v disc ceramic capacitor.

This change is applicable to units prior to serial number 407XXXX. Time required for this modification is half an hour or less. This modification may be performed in warranty on a case by case basis. (Thanks, Trio-Kenwood Communications)



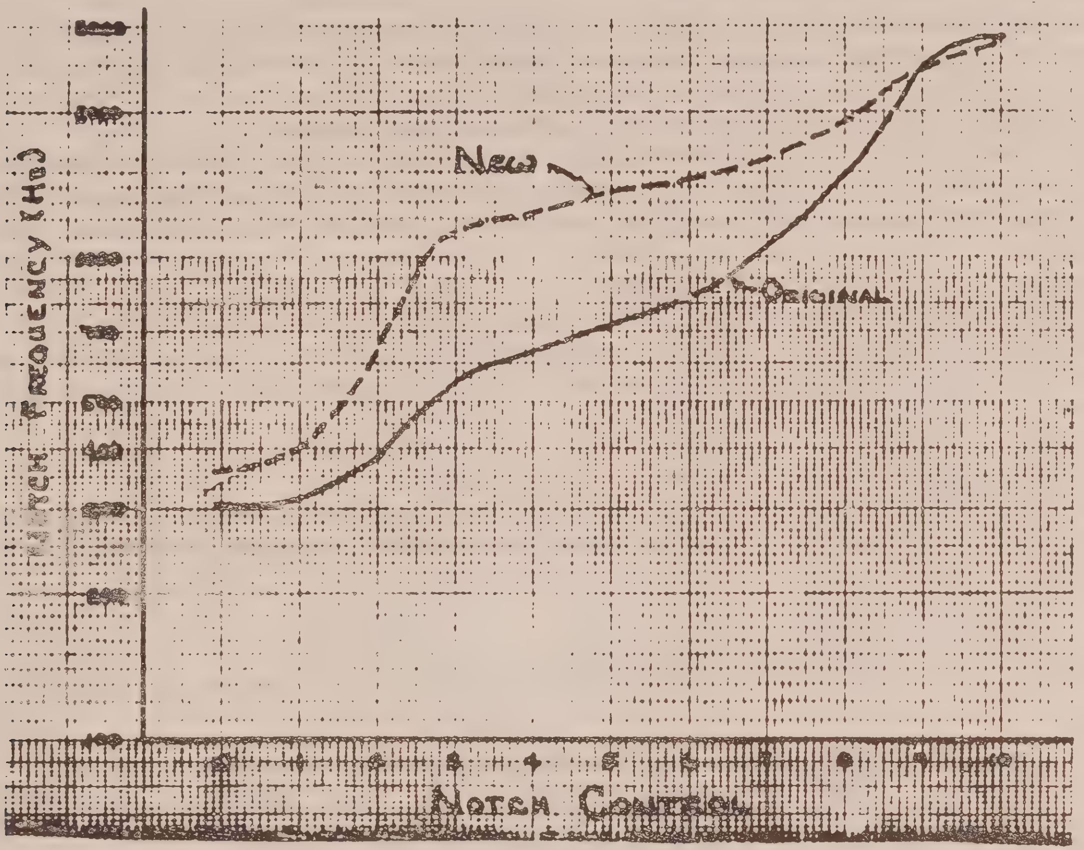
TS-430S NOTCH FILTER TEST

The TS-430S notch filter is designed to reduce or eliminate heterodyne (Carrier-Type) interference. The notch filter is very sharp and provides approximately 40 dB of attenuation. A notch filter cannot be effective against a SSB-type signal. To check notch operation proceed as follows:

1. Remove the top and bottom cases. (Careful of the speaker lead!!)
2. Connect the MKR connector on the Control Unit and the RF Unit M terminal with the jumper cable supplied with your TS-430S.
3. Turn on the Control Unit CAL Switch.
4. Tune the VFO to receive the Calibrator signal as a 900Hz tone.
5. SLOWLY adjust the Notch control. You should see approximately 40 dB (S9) of attenuation at the notch point (approximately 12 o'clock on the control). The notch point is very sharp, so if you tune too fast, you may go past it. The notch range is 30Hz – 2600Hz, nominal.
6. After verifying Notch operation, reverse Steps 1 to 3 to reassemble the set.
7. If you cannot notch out the Calibrator signal, please contact your authorized Kenwood Dealer for service. (Thanks, Trio-Kenwood Communications)

TS-430S NOTCH CONTROL

Notch-Squelch control (VR5) may be replaced with part number R24-9403-15 to allow greater flexibility in adjustment. As can be seen from the chart below, the curve is smoother on the high frequency side (1kHz to 2.7kHz) making tuning easier. VR5 is located on Switch Unit (X41-1470-00). Note - This is an optional change and may not be performed in warranty. (Thanks, Trio-Kenwood Communications)



TS-430S PROCESSOR - ADJUSTMENT

We have received several reports that the TS-430S processor reduced power output instead of enhancing the output. We, at IRI Lab, also found while performance testing newly purchased 430's that the processor was not set up correctly. If your's is not functioning, or you would like to check it, follow instructions below:

1. Connect a 1 kHz 10MV signal generator into the mic jack Pin 1. Pin 7 is ground.
2. Transmit into a 50 ohm dummy load. Adjust power output in LSB or USB to 25W.
3. Turn on processor switch. Power output must remain the same. If not, adjust VR7 on IF Unit Board. IF Board is located below top cover. VR7 is located toward the front of the IF board next to an Allen Head screw.

MORE TS-430S MODIFICATIONS

1. Problem: Lack of crispness in Receive Audio -

This is due to a minus 9.5 dB or 88% rolloff at 2900 Hz in receive audio. This can be improved by changing C42 on the IF unit from a .033 microfarad to a .0033 microfarad non-inductive capacitor. A disc ceramic type is acceptable.

2. Problem: Lack of crispness in Transmit Audio -

This is caused by misalignment of the carrier oscillators and by C96 on the IF Unit. C96 should be changed from a .015 microfarad to a .001 microfarad 50 volt disc ceramic. The carrier oscillators should be adjusted for a minus 6 dB rolloff at 2800 Hz transmit audio frequency - fed into the microphone jack. The zero dB reference point is 1000 Hz. This can be done "by ear" with good results on receive audio sound

3. Problem: Noise blanker seems ineffective!

This is caused by an over-enthusiastic noise blanker AGC which causes the NB to shut off prematurely. This can be corrected by changing R81 on the RF unit from a 10K to a 24K to 43K ohm resistor. Tune T15 and T16 for minimum noise.

4. Problem: AGC overshoot immediately after transmitting and receiving a strong signal: This is characterized by a brief loss of receive audio volume that lasts about 2 seconds. This problem can be intermittent. This is corrected by changing the AGC delay resistor (R40) on the RF Unit from a 47K to a 10K to 33K ohm resistor.

5. Problem: Inadequate VOX gain.

Cure: Change the VOX pick-off point to a point with a higher audio level. To do this remove C95 on the IF unit. Connect C95 in series with a 22K to 10K one-quarter watt resistor and connect underneath the circuit board from Connector No. 11 Pin 7 (VOX) to the junction of C105 and R176. This junction is almost underneath the small blue teardrop shaped .47 microfarad tantalum capacitor that is near IC6 and mounted under the circuit board. The side of R176 that you do not connect to is connected to Pin 3 of IC6.

6. Problem: Lack of transmit capability in other service bands:

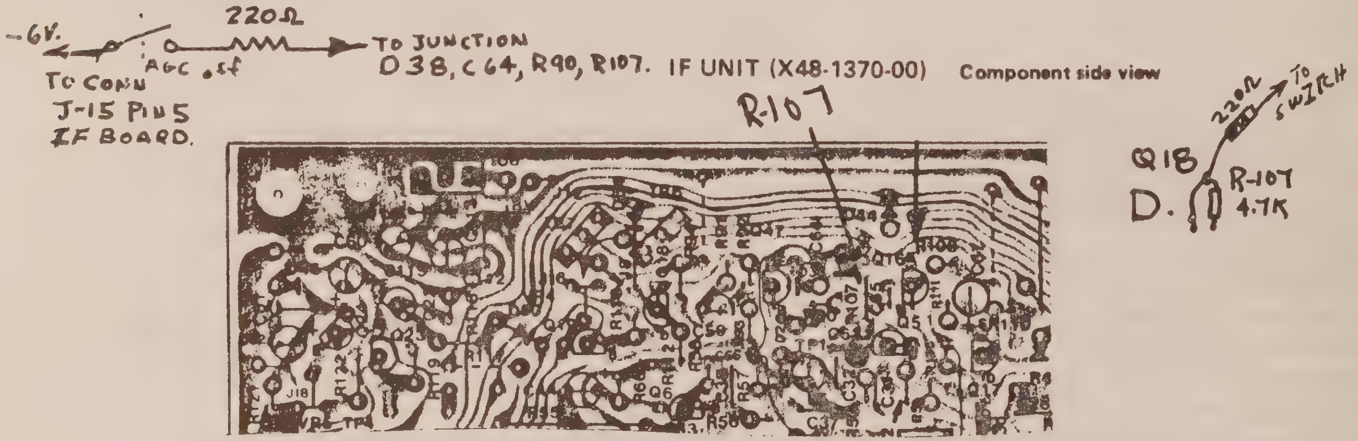
On the RF unit, Plug No. 10, remove Pins No. 2 and No. 3 by using a small screwdriver to press the release tabs. These tabs are accessed through the rectangular slots in the plug body. The two released pins should be inserted in a piece of insulated tubing to prevent shorts.

7. Problem: Noisy transmit-receive relay:

Most of this racket is made by the 20 dB relay, which actuates during transmit - if the 20 dB ATT switch is in the Off position. Sole control of the 20 dB relay can be restored to the 20 dB switch by cutting R28 (2200 ohms) on the switch unit. The switch unit is behind the 20 dB ATT switch.

TS-430S AGC OFF

There may be times in CW mode, particularly when turning off, the AGC will allow you to listen to a weak signal with a strong signal nearby. Most expensive receivers have this capability. Here's how!!!



IF UNIT (X48-1370-00) Component side view

Use an external switch or add extra switches as outlined in the October Kenwood Newsletter. This mod was engineered by N8RT at International Radio, Inc. Labs.

TS-430S IF FILTER MOD

The Kenwood TS-430S allows for great flexibility in selecting different IF filters. It comes with a 2.4 KHz (6 dB) wide filter for SSB and CW and has a slot for both narrow SSB (1.8 kHZ) and narrow CW (either 270 or 500 Hz) filters. In addition, a 6 kHz wide filter is available for AM. The filters are automatically selected according to the mode selection (CW, USB, LSB, etc.) and according to the narrow-wide switch. One limitation of this is that the narrow CW filter cannot be used in the LSB mode. Most RTTY operation with this rig will be done in the LSB mode and having a narrower filter would reduce the effects of QRN and QRM.

The original circuit (FIG 1A) uses a diode switching approach to select the appropriate filter. Connector No. 27 (may be labeled No. 29 in the Instruction Manual) comes from the narrow-wide switch on the front panel. Either of the control lines SSW or CWW go high in the wide position, depending on the mode (SSB or CW respectively). Similarly, SSN or CWN go high in the narrow position, according to the mode selected. These control lines connect through resistors (and sometimes diodes) to the appropriate IF filter. A modified circuit (FIG 1B) is shown which allows for the use of the narrow CW filter in the SSB mode. In the LSB mode, in particular, this filter ends up being centered around an audio frequency of about 2 kHz, which is ideal for RTTY interfaces using audio tones in that area. The IF shift control can be used to adjust this frequency, if necessary.

In normal transceiver operation, switching from CW or SSB often results in the narrow position selected in the SSB mode. If no narrow SSB filter is installed, the IF section is simply left open and no signals can be heard. The suggested but untested circuit shown in FIG 1C will enable the wide filter in SSB mode regardless of the narrow-wide switch position.

To locate the appropriate area inside the transceiver, follow the instructions for installing the optional filters. R7 and R8 are located towards the rear of the IF filters. The ends of R7 and R8 nearest the rear of the transceiver go to connector No. 27. (Be careful in unsoldering the resistors because the printed circuit board traces are delicate.) (Thanks, Ham Radio Magazine)

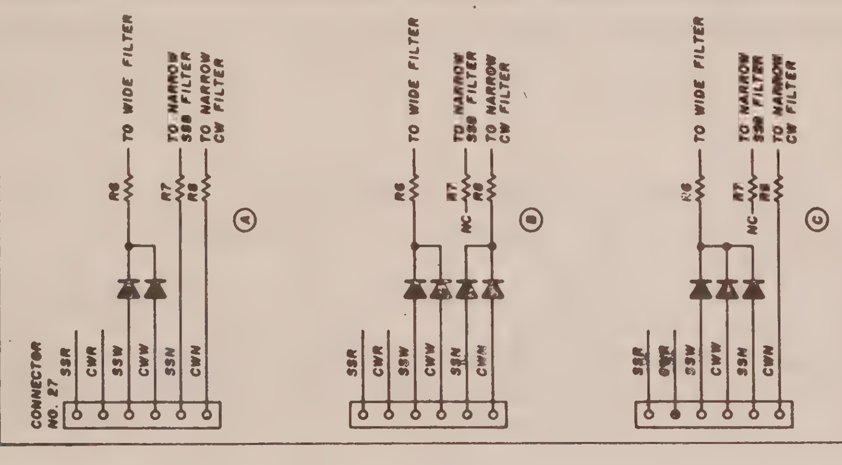


fig. 1. (A)Original circuit selects the appropriate narrow filter depending on whether the transceiver is in SSB or CW mode. (B)Modified circuit allows for narrow CW filter to be used in both CW and SSB modes. (C)Suggested circuit for enabling the wide filter in SSB/narrow mode.

TS-430 TRANSMIT AUDIO MOD

Add more treble to your TS-430S by removing C96 (.015mfd) on the IF Unit Board. The removal of C96 adds about 3 dB of precense to your transmit audio. (Thanks, WBOSTL - From Kenwood Net)

TS-430S OPERATION WITH TV-502S AND TV 506 TRANSVERTORS

The TS-430S was not designed to operate with the older TV-502/S, TV-506 series Xvrtrs. These units require -100V DC to operate the protection, ALC, and FET bias circuits. The TS-430S, being all-transistor, has no need for a high negative voltage and therefore cannot supply this -100V DC to the Xvrtr. An external negative voltage source will be required.

Actual voltage required is -15V DC for the protection circuit at the collector of Q1 on the Control unit X53-1040-00, and -6V DC for FET bias at D1 on the RF unit X44-1120-00.

Connectors

TS-430S Xvrtr 8 pin DIN part # E07-0851-05
TV-502/S, TV-506 Xvrtr 12 pin part # E09-1271-05

You may either modify the original cable supplied with the Xvrtr, or fabricate a completely new cable using the connectors listed.

Connector Pin-outs

TS-430S

Pin 7. Output: TX drive approx 0.7 RF across 75Ω.
1. O/P: TX Drive ground.
4. Input: Relay ground return to energize pin 7 at Xvrtr ON.
2. O/P: 14V DC in TX to energize Xvrtr.
5. I/P: RX ANT into the TS-430S. At Xvrtr ON, RX I/P. At Xvrtr OFF, HF ANT must be bridged from pin 8.
8. O/P: HF ANT through-connection. At Xvrtr OFF, connects to pin 5. At Xvrtr ON, no connection.
3. O/P: HF ANT ground.
6. I/P: ALC I/P to the TS-430S from the Xvrtr.

Metal Shell is common ground.

Switched functions are automatic when the Xvrtr plug is installed.

TV-502/S

Pin 1. O/P: ALC to Xcvr.
2. No connection.
3. I/P: Xcvr screen grid voltage, NOT USED.
4. O/P: Ground at Xvrtr ON, opened at Xvrtr OFF.
5. I/P: -100V DC @ 5ma, bias.
6. O/P: At Xvrtr OFF, HF ANT through-connection from pin 7.
7. I/P: HF ANT from the Xcvr.
8. I/P: Standard: Must be grounded to RX, opened to TX.
Modified: Opened to RX, +14V DC to TX.
9. I/P: Ground.
10. O/P: Xcvr final screen grid return, NOT USED.
11. I/P: Ground.
12. I/P: Ground.

Modifications required to the Xvrtr

Supply negative voltage to the Control and RF units as specified in the introductory paragraph.

TX Relay control, pin 8 on the Xvrtr connector must be grounded to RX, and opened to TX. The TS-430S Xvrtr connector Pin 2 supplies just the opposite: 0V in RX, 14V DC in TX. Modify the Xvrtr AVR unit X43-1150-00 at Q8 as shown on the accompanying schematic to reverse this function. Break the 9V DC line by removing R9. Reinstall R9 in the SS line (from Xvrtr pin 8).

Interconnection

TS-430S to TV-502/S, TV-506

Pin 7	TX IN jack signal
1	TX IN jack ground
4	4
5	6
8	7
3	11, 12
6	1

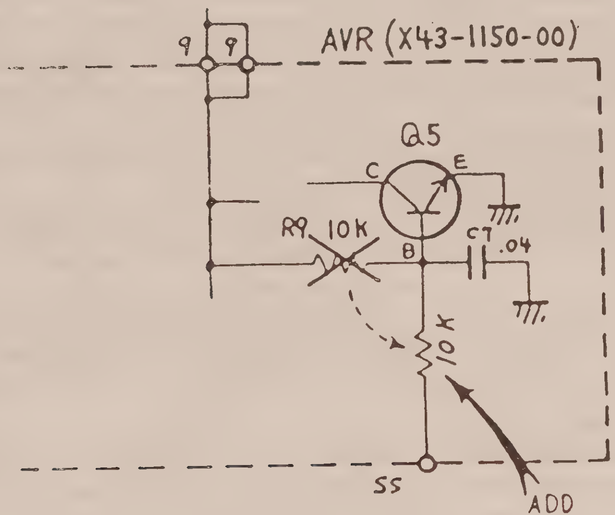
Metal Shell to 9

-100 V DC must be supplied to the Xvrtr connector pin 5, or -15V to the Control unit, and -6V to the RF unit as previously stated.

Alignment, Xvrtr

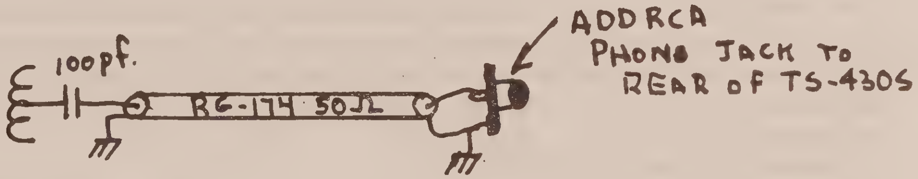
The Xvrtr ALC and Protection circuits may need touching-up. Refer to the Xvrtr Service Manual for alignment information.

(THANKS TRIO-KENWOOD COMPTON CA.)



SIMPLE SM-220 TS-430 INTERFACE

If you already have a SM-220 scope, you can watch received signals (non-panadapter mode) by bringing out the TS-430 8.8MHz IF. This is done by using the unused center tap on L4 on the IF Board. See diagram below: (From the Kenwood Net)



AUXILIARY SWITCHES FOR THE TS-430S

Notwithstanding its compactness, the TS-430S is an experimenter's delight as is demonstrated by the numerous modifications published in the TK Newsletter. Yet a problem remains of how to switch various added items on and off without giving up any of the switching functions already on the front panel.

I faced the need for additional switches for controlling an added Magicom RF Speech Processor and a 400Hz filter on lower sideband for RTTY reception. Holes in the front panel or cabinet, or other ghastly alterations, were unthinkable. Dangling wires and switches, besides being unsightly, would be prone to picking up stray RF.

The technique which I worked out can provide as many auxiliary switches as anyone might ever need, all within the 430's RF tight enclosure while preserving the transceiver's trim appearance and clean lines.

1. Purchase a 10 tab DIP switch. Look for one with a black body and relatively tall white slide switch tabs. Radio Shack DIP switches do not have tall enough tabs. Also purchase a 20 pin IC socket, but not a low profile socket as they tend to come apart.
2. File off the tabs of switch positions 2, 3, 5, 6, 8 and 9. I used a Dremel grinder but the end of a flat file should do the job.
3. Remove the top cabinet cover of the TS-430S. Note that the DIP switch fits perfectly into the slotted ventilation grillwork of the cover, with switch tabs 1, 4, 7 and 10 extending up through the slots and operable from above. The exact location of the DIP switch is a matter of personal preference, provided that it does not interfere with components on the IF board. I chose the frontmost grill just left of center.

4. Very carefully apply the smallest possible amount of Super Glue (Cyanoacrylate) to the top of the DIP switch body, taking care to keep the glue away from tabs 1, 4, 7 and 10. Use a pin to transfer three or four dots of glue from the tube. Do not squeeze glue directly from the tube on to the DIP switch. Take special care not to drip glue on the transceiver cabinet.

5. With the top cover upright, position the DIP switch from below and press it into the underside of the grill for at least 10 seconds. Position it right the first time as it cannot be adjusted. Coming up from below helps ensure that any excess glue will not run on to the outer cabinet cover. (I tried removing the DIP switch with a sharp blow. Damage to the paint on the underside of the grill was very slight and was not visible from the outside.)

6. Using very flexible wire, hook up the circuitry to be controlled to the IC socket which enables easy removal of the transceiver cabinet top.

7. Each of the four switches is SPST. The switching arrangement for the 400Hz filter requires SPDT contacts. I used a Radio Shack subminiature 5 volt SPDT relay operated by one of the DIP switch tabs.

The switches are easily operated with a fingernail, yet the small white tabs do not project high enough above the cabinet to get in the way. The tabs nicely match the white lettering of the panel and Vox controls. (Thanks, Mel Silver, W9RXU © 1984)

TS-430S TRANSMIT SWR-POWER ADJUST

If you find the SWR protection circuit reducing your output power of the TS-430S, try this. Remove the top cover, locate two small holes on the right rear side. If you look carefully with a flashlight thru the holes, you will see two trimmers. The one to the inside of the radio is the ALC; the one to the right is the PRO. The ALC control is the Power output adjustment; the PRO trimmer is the SWR protect sensitivity. Turning it clockwise will decrease the 430 sensitivity to SWR. Don't turn it fully clockwise or you may defeat the SWR protection circuit and ruin the finals.

TS-430S 500 KHZ HETRODYNE

Some users of the TS-430S have reported a hetrodyne signal at the 500 kHz point on the band. This tone may be reduced or eliminated by the following procedure:

Parts required: One .001uf disc cap. (CC45B1H102K); one 220pf disc cap. (CC455L1H221J); one 470uh coil (L40-4711-12).

Procedure:

1. Remove top and bottom covers.
2. Turn radio bottom up and locate PLL Unit (X50-1910-00).
3. Remove the six (6) screws securing the PLL unit to the chassis and fold the unit over to allow access to the foil side of the circuit board.

Remove the jumper wire that is installed between TP-1 and C6. Install the parallel circuit consisting of the 220pf capacitor and the 470uh coil in its place. (See Figure 2.)

5. Install the .001uf capacitor as shown in Figure 2.
6. Reinstall the PLL unit and replace the top and bottom covers.
7. No alignment is required.

Please note - This change may be performed at the owner's option and may not be performed in warranty.

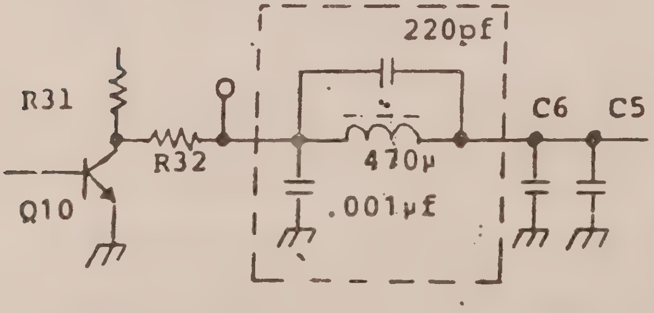


Figure 1.

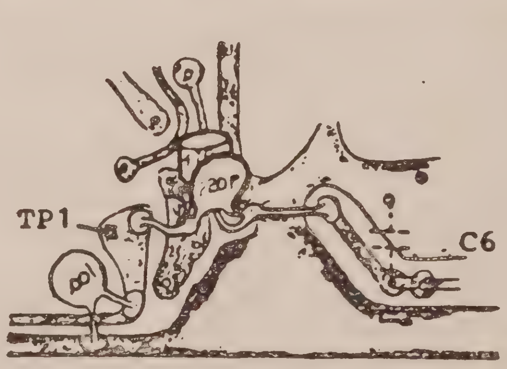


Figure 2

TS 430 VSWR PROTECTION ADJUSTMENT

Better, easier, sure way to adjust VSWR protection on any solid state rig; however, basic method for TS 430 is outlined here. If VSWR protection is reducing TS 430 power early, or you are not sure of your protection try this. Remove top cover, find VR2 protection adjustment (right rear corner). Turn TS 430 on. Be sure carrier control is full CCW. Set frequency to 1.850 MHz. Set meter to IC position. Remove mic. Remove antenna (yes, no load); isn't this what VSWR "protection" is all about? Key Send Switch. Very slowly, insert Carrier CW (in CW Mode) until full carrier is inserted. (Watch IC meter, do not exceed 8 amp.) If TS 430 IC is less than 7.5 amp, adjust VR 2 CW to read 7.5 amp. Check all bands in same manner. If you have more than 8 amps before adjusting VR 2, I would like to hear from you, and I suggest you lower to 7.5 amps. After adjusing VR 2 as described, your TS 430 should come out close to the following table:

MHZ	IC
1.850	7.5
3.795	0
7.225	+5
14.250	2
21.3	+7
28.6	+5

Note: Any solid state rig VSWR protection can be adjusted in like manner. Stay below one half of maximum IC with a load. Example: If your rig draws 21 amps, full power with a load, stay below 10 amps with no load.

I try to adjust for about one third of full IC as you can see from Table A. This method has worked for me for several years on several solid state rigs. I have never lost a final, and quite often fire up with No Load on one of the three rigs. I have tried several formulas. This is most comfortable for me.

Before adjustment, my TS 430 was running 50 watts Full power, VSWR was 1.3:1 on 21.3 MHz. After adjustment, my TS 430 delivered 104 watts VSWR was 1.49:1. With no VSWR, my TS 430 delivers 110 watts to Bird 43 and 50 ohm dummy load. I am very comfortable and pleased, and my TS 430 loves me too. (Thanks to Bill Fanning, ND4P)

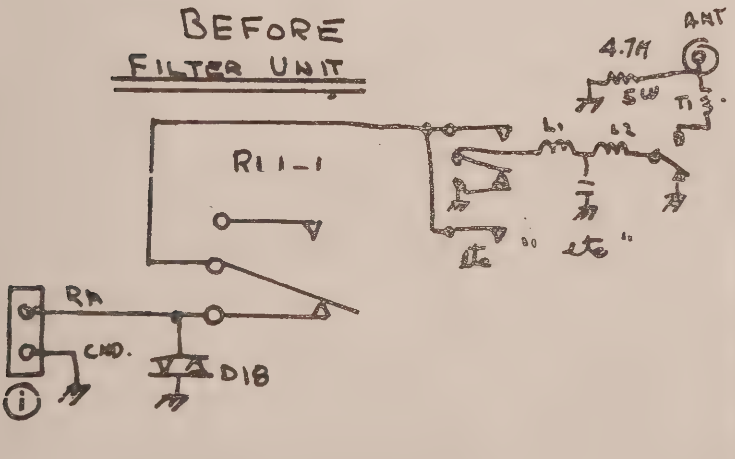
TS–430S INTERMITTENT RECEIVE

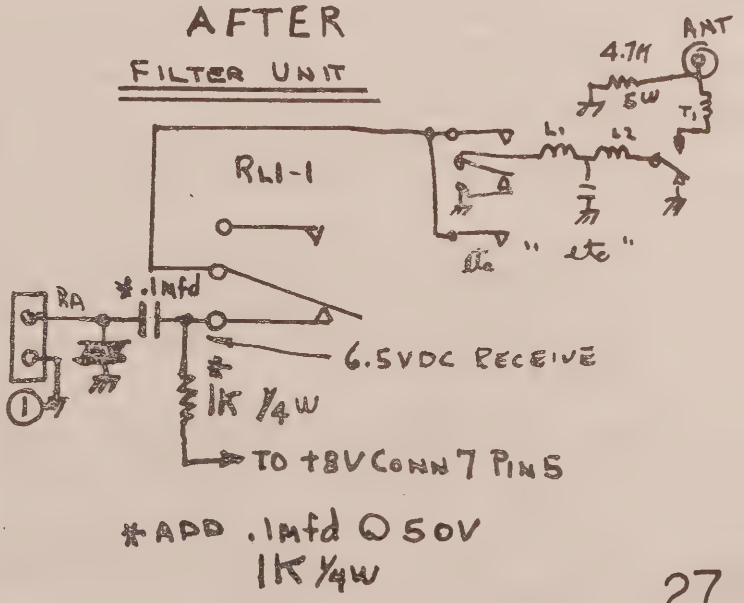
Several TS-430S transceivers have been reported to have intermittent receive problems. Sometimes changing bands or depressing PTT SW or Send Switch restores sensitivity.

IRI Labs found the problem to be related to the filter board relays RL1-1 through RL15 not making a reliable contact in Receive mode. Further troubleshooting revealed the following:

- Burnishing the relay contacts did not help!
- A good quality relay contact cleaner helped but the problem came back!

The solution that worked was to introduce a small amount of DC current through the relay contacts so that they are not dry switched in Receive mode. See Before and After schematics below for the fix!





Notes:

1. Make sure that the 4.7k 2 watt resistor is across the antenna connector. (It is not shown on schematic.)
2. Check the DC voltage at the 1k resistor and RL2. You should measure approximately 6.5v DC.
3. For best results, clean all relay contacts RL1-1 through RL-15 on Filter Unit board by removing relay plastic cover, then burnish contacts.
4. The TS-430 we repaired was Serial Number 3080408.

Modification by International Radio Inc. Labs.

TS-430S PLL UNLOCK AT HIGH TEMPERATURES

For cases of PLL Unlock at high temperature suspect a problem in the area of IC16 on the Control Unit (X53-1290-XX). We have found that occasionally low input levels to IC16 can cause the PLL to unlock. By performing the following modification, the input level to IC16 may be increased, and this tendency thus reduced.

Procedure:

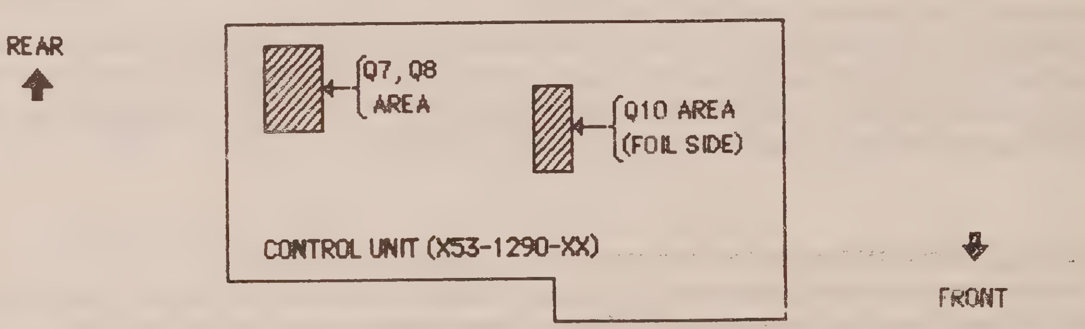
On the Control Unit:

Change R29 (Base circuit of Q7) from 1k ohm to 820 ohm.
Change C41 (Base circuit of Q8) from 22 pF to 100 pF.

On foil side of the Control Unit in the Collector circuit of Q10:

Change R209 from 3.3k ohm to a 1.5k ohm resistor.

Time required for this modification is 30 minutes or less. (Thanks, Trio-Kenwood Communications)



TS430S INCREASE SENSITIVITY 0.5 TO 1.6MHZ

I recently bought a Kenwood TS-430S for use as my base transceiver and HF mobile. I was particularly attracted by the full coverage receiver.

After having owned the transceiver for about three months, my only criticism was the relatively poor sensitivity on the broadcast band. This is, however, in keeping with the receive specification.

I could see no reason why the sensitivity should be reduced in this band. On studying the circuit of the receiver front end, the reason was obvious.

At the output of the receive bandpass filter for the 0.5 to 1.6MHz band, there is an attenuator, resistors R6, R7, R8. (This is on the RF Unit X44-15100-00.) These resistors form a 20 dB attenuator.

I decided to remove the attenuator and so bring the performance on the broadcast band up to the rest of the frequency coverage.

To remove the attenuator, remove the bottom cover of the TS-430S. The large printed circuit board on the bottom is the RF Unit. Resistors R6, R8 (68 ohms) and R7 (220 ohms, not 22 as shown in the circuit) are at the rear of the unit and near the center. Remove the screws holding the board, then disconnect all the plug-in connectors, carefully noting their positions.

Very carefully unsolder R7 and R8 (the two 68 ohm resistors). Solder a piece of wire across the 220 ohm R7. It is not necessary to remove R7.

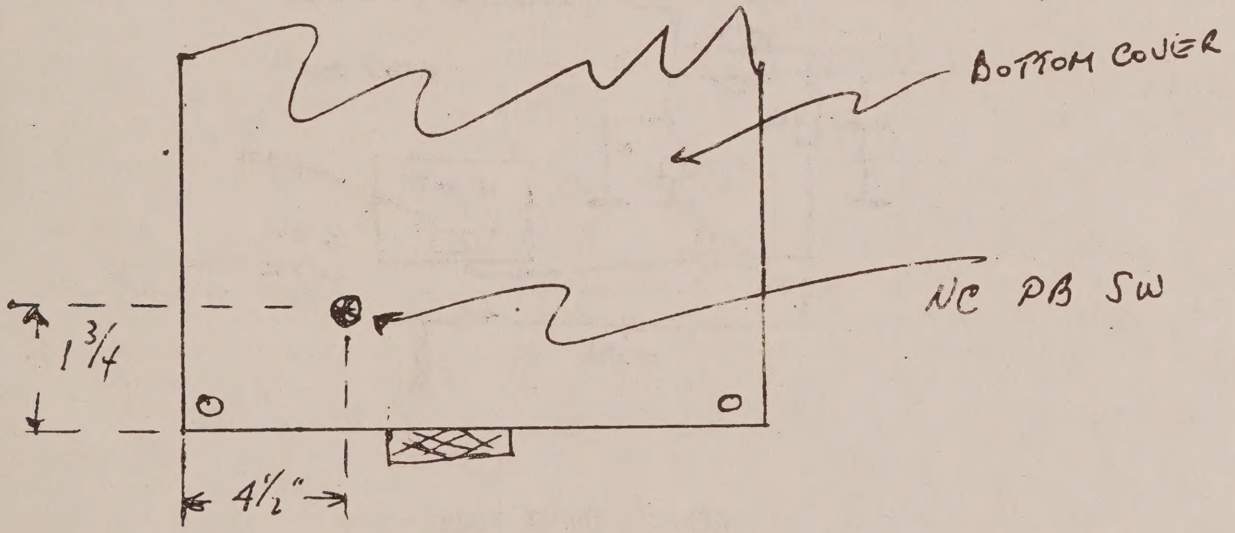
Replace the printed circuit board and insure that all the connectors are in their correct places. Replace the bottom cover and you will now have one of the most sensitive broadcast receivers available.

I have not experienced any problems with strong signals and can now listen to many signals that were noisy before. Fortunately, the noise level at the QTH allows me to make use of the sensitivity. The switchable attenuator is still there if there are any problems with front end overload. (Thanks, Break-In)

TRANSMIT FREQUENCY SET SWITCH FOR TS-430S

It is a relatively simple mattter to incorporate a T-F Switch for the TS-430S enabling operation similar to that of the TS-930S. I mounted this switch on the bottom cover, offset to right of center, as indicated in the sketch. It is easily reached by finger tip from the front and is not visible. This capability with this modification is only in service when the Function Switch is in the B-R position. Pressing on the switch enables the operator to instant receive and set the transmit frequency on the A VFO. I have found this to be a very desirable feature when operating split frequency. I used a normally closed SPST Miniature push button switch similar to Radio Shack #275 1548.

To make this modification, remove top and bottom covers. Remove the two screws at the rear of the filter board chassis and swing the chassis up toward the front of the 430. This will allow access to plug #26 on the Control Unit Board, X53-1290-00. Looking from the front of the 430, it will be second on the right hand side. Pin #4 of Plug #26 on my model has a white and blue lead and is the nearest to Plug #27. Open this lead and attach a flexible 2 conductor cable and run it to the push button switch. Allow sufficient length of this two conductor cable to permit the bottom cover to be moved free from the 430. When assembling, neatly coil this cable so it may be stowed beneath the bottom cover with no danger of crimping. In essence, this modification opens the FB lead to the function switch and VFO A operated which is the transmit VFO in the B-R position. (Thanks, H. H. Ferris, W1HZ)



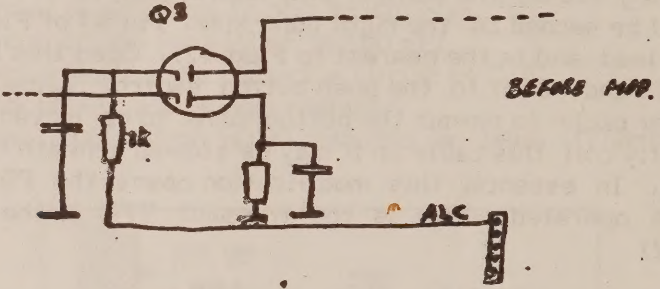
TS-430 FINAL POWER AMPLIFIER ADJUSTMENTS

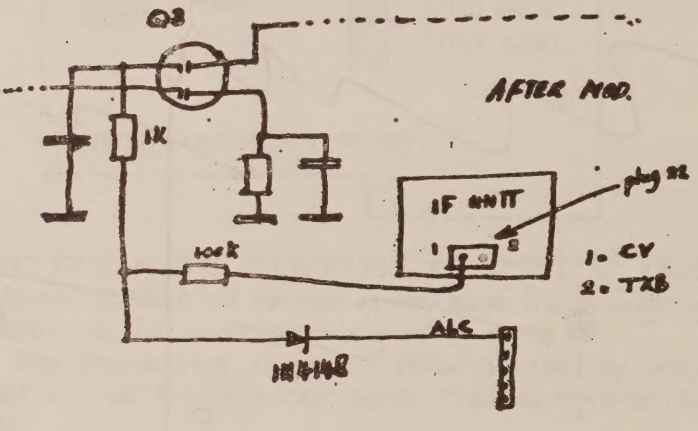
Most problems with the final amplifier in the TS-430S have been traced to an out of adjustment bias current. (See the TS-430S Service Manual, Pages 43 to 45.) After performing Step 1, come back to these instructions.

Note, after Step 1, you must switch back to Receive mode before moving on to Step 2. Use a meter that will read at least 2.5 amps and preferably 10 amps. Make sure that there is a fuse in the meter, one slip with one of the pots will smoke the meter. Use a digital meter for accuracy. You will not be able to correctly adjust the TS-430S final using an analog meter with only a 10% variation. Check that the DC supply is putting exactly 13.6 volts DC into the rig. After the meter is connected in the DC line (I use 6 penny nails and jumper wires), then measure the RECEIVE resting current. It should be about 1.603 amps. Here is where the Service Manual misses a point. When you switch to transmit, you will show a current increase of about 400 ma, but you do not know which of the amplifier stages is drawing what amount of current. At this point, turn VR2 counter clockwise all the way down. You have now shut off all of the bias current to the final amplifier and are measuring only the driver current. Adjust VR 1 (driver bias) until the digital meter measures exactly 200 ma more than the RECEIVE resting current. (I always back it off to 195 ma at this point because it will drift up with heat as you adjust the final bias.) Then adjust VR2 carefully until you have a meter reading of 400 ma more than the RECEIVE resting current. You have now completed setting the bias points of the linear amplifier. You should have a meter reading of 2.003 amps if you started with 1.603 amps.

TS-430 FM POWER MODIFICATION

For the FM mode, there is the following mod. It allows continuous HF output by means of the CAR level control (0-50 watt). The following circuit is out of the FM 430 board. Great to go QRP on 10 meters when the band opens up again! (Thanks, Erik Sablerolles, 9J2LG)





GENERAL ORDER FORM

ITEM	DESCRIPTION	PRICE